

Information is not knowledge. *Understanding* information is knowledge.
Blind belief in authority is the greatest enemy of truth. **Albert Einstein**

If the work of God could be comprehended by reason, it would be no longer be wonderful
Faith would have no merit where human reason supplies proof. **Pope Gregory the Great**

Nothing can better deserve our patronage than the promotion of science and literature.
Knowledge is in every country the surest basis of public happiness. **George Washington.**

Time advances; facts accumulate; doubts arise.
Faint glimpses of truth begin to appear and shine more and more unto the perfect day.
The highest intellects, like the tallest mountains, are the first to catch and reflect the dawn.
They are bright while the level below is still in darkness.
But soon the light descends on the plain and penetrates to the deepest valley.
First come hints, then fragments of systems, then complete and harmonious systems.
The sound opinion, held at first by one bold speculator, becomes the opinion of a
small minority, of a strong minority, of a majority of mankind. **Lord Thomas Macaulay**

The American government is premised on the theory that if the mind of Man
is to be free. His ideas, his beliefs, his ideology, his philosophy must be
placed beyond the reach of the government. **Justice William O. Douglas**

We can only think in concepts and words we know. **Lev Vygotsky**

All knowledge resolves itself into probabilities. Every statement is 1. either true or
false by definition (whose denial is false) or 2. Contingent unnecessary assertions
dependent on empirical proof (whose negations may be true), or 3. Nonsense. **David Hume**

Anyone who can make you believe nonsense can make you commit atrocities. **Voltaire**

There is only one good, knowledge, and one evil, ignorance. **Socrates**

The man who does not read has no advantage over one who can not. **Mark Twain**

It is undesirable to believe a proposition when there is no ground whatsoever for
it to be true. That an opinion is widely held is no evidence it is not utterly absurd.

Indeed, in view of the silliness of the majority of mankind, a widespread belief
is more likely to be foolish than sensible.

Most people would sooner die than think. In fact, they do so.
All acquisition of knowledge is an enlargement of the self. **Lord Bertrand Russell**

The more we know, the more fantastic the world becomes. **Aldous Huxley**

That absurd raving which defends liberty of conscience for everyone. From this comes the
worst plague of all - unrestrained liberty of opinion, freedom of speech. **Pope Gregory 16**

It is in no way lawful to defend, or grant unconditional freedom of thought, or speech, or
writing or of religion, as if these were so many rights given by nature to Man. **Pope Leo 13**

One miracle is just as easy to believe as another. **William Jennings Bryan**

That pernicious and insane opinion that liberty of conscience
and of worship is the right of every man. **Pope Pius 10**

An Incomplete
HISTORY *of* KNOWLEDGE

What Man Knew, or Thought He Knew

Thomson von Stein

In Memory of Henry Albert Todd

Abbreviations

& = and (Used often for space purposes) AD = *Anno Domini*, year after **Jesus's** reputed birth a = acceleration
B = billion BC = Before Christ BTU = British Thermal Unit
c. = circa / approximately c = speed of electromagnetic waves / light in the equation $E = mc^2$
E = energy F = force (we know what forces *do* but not what they *are*)
GmbH = *Gesellschaft mit beschränkter Haftung* / Business with limited Liability = corporation GR = *General Relativity*
HRE = Holy Roman Empire K = thousand or kilometer or Kelvin degrees KE = kinetic energy Kps = kilometers per second
m = mass M = million MP = member of Parliament mps = miles per second
n = number of moles of gas NT = *New Testament* OT = *Old Testament*
PM = Prime Minister P = pressure p. = page
ref. = referred to at year ____ re = regarding R = ideal gas constant,
S = South, N = North, E = East, W = West
T = trillion or temperature in the **Kelvin** scale. ("0" **Kelvin** = minus 273.16 Celsius / Centigrade
U or Univ. = University V = volume or Venus VP = Vice President vs. = versus, against

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This book uses the words “Man” and “mankind” to denote the human species, as they have been used from day one. They do not mean “male”. Concurrently, the myth of male supremacy has been virtually universal. It is enshrined in the world’s major religions, in the *Hebrew Bible*, in the *New Testament* and the *Koran* as well as in the *U S Constitution*.

In history a few courageous women have challenged the myth. It was not until the 20th century that the equality of females became accepted by most educated persons in the West. For better or worse, history has been written by men for men. Literature like **Darwin’s** *The Descent of Man* and **della Mirandola’s** *The Dignity of Man* clearly show “Man’s” meaning. We use herein both gender neutral and traditional usages to avoid corrupting someone’s words.

God/gods referred to herein are considered to be beyond gender identification unless otherwise indicated.

Gods claimed to be monotheistic are capitalized. Other “gods” are not. We try to avoid redundant adjectives.

We use “BC” and “AD” for years before and after **Jesus’s** putative birth as they are the most widely understood. Roman monk **Dionysius Exiguus** established the AD-BC (*Anno Domini* -Before Christ) dating system on what he calculated as AD 525. It was not fully accepted in the West for centuries as numerous groups had their own systems. Even how he picked 525 is unknown. So, all dates before that are uncertain although probably accurate estimates relative to each other. In AD 731, monk **Bede** similarly said to make **Jesus’s** birth as year one.

Roman numerals are changed herein to Arabic numerals. Names of real persons are in **boldface**.

Titles: Saint, Lord, King, Sir, Pope, Khan, Bishop, Caesar, Prince, Baron, Cardinal, Marquis, Count, Comte, are not.

Italic: *Titles of documents, non-English words, and words meant to be emphasized* are in *Italic*.

Some statements /quotations made before **Samuel Johnson’s** 1755 *Dictionary of the English Language* have been put into Modern English. In the West, all writings before printing (c.1450) were hand-copied.

Sources are quoted or paraphrased without attribution throughout.

Words on pages 3-395 are indexed to the year (left margin) where the word is found, not the page they appear.

Words and sentences originally not in English often have differing translations in English.

Important books do not have to be long. **Descartes’s** *Discourse on the Method* (1637) was 25 pages, a normal size for ancient “books”. Some important scientific discoveries did not become widely known for decades or more. We describe those discoveries when they became part of the wide body of knowledge.

Priests: Lamas, shamans, seers, medicine men, oracles, sorcerers, witch doctors, divines, holy men, soothsayers, prophets, wizards, witches, priests, rabbis, gurus, monks, imams, pastors, ministers, bishops, i.e., those who claim some affiliation with a supernatural entity are herein called “priests” unless otherwise specified.

Arabic name prefixes: *ben-bin-ibn* = son of. *abu* = father of. *al-* = tribe, family or town. *abd* = servant of.

The **Abdullah Yusuf Ali** translation of the *Koran /Qur’an* is used herein. A final *Koran* was not determined until c.925.

A note on the Bible: (Greek-*biblios* = book) The *Bible* (and *Koran*) describe their God as male. *Wikipedia* lists 49 versions of the *Bible* in English. The official Catholic *Bible* is the *Vulgate*, in Latin. The *King James Version* (“KJV”) of the *Bible* published in 1611 and called the “*Holy Bible*” is used herein as it is the most widely known version 80% of the *Bible* is the *Hebrew Bible*. Various English language versions of the *Bible* use more modern words than the KJV.

Biblical scholars have pointed out numerous differences between the KJV and more ancient texts (and modern texts). There are variations among the numerous Jewish and Christian scriptures or portions thereof, including early versions of such scriptures, due to accidental or intentional changes by the scribes who copied them. For example, **Martin Luther** made a crucial substantive theological change when he changed “faith” to “faith alone” as necessary for salvation in his translation of the *Bible* saying, “It’s my *Bible*.” Similar considerations apply to the *Koran/Qur’an*.

A note on attributions. Sources are quoted or paraphrased herein without attribution throughout. In 1936, a sometime actor and teacher, **Dale Carnegie**, wrote *How to Win Friends and Influence People*. It sold over 30 million copies. It is a perennial all-time best seller. On one occasion, he was accused of a particular instance of plagiarism. He replied, “The ideas I stand for are not mine. I borrowed them from **Socrates**. I swiped them from **Chesterfield**. I stole from **Jesus**.” This textbook takes from reliable sources. There are millions of historical facts. Historians use facts and ideas and phrases from wherever they can find them. The process of writing a history book is trying to find and connect the facts and ideas to explain phenomena. When the identity of a cited source is relevant, that person is cited.

The *Electromagnetism* and *Astronomy Timelines* at pp. 422 and 432 are stand alone timelines after the main text.

The author has a B.A. from Williams and a LL.B. from Stanford. Technical assistance, **Lora Foley**

Author's note, What this book is about.

There are many books about sciences, religions, philosophies. We here try to put their essences in turn to show the history of the full body of knowledge as it grew. We describe facts/events/statements/ which are the basis of knowledge. Ideas can be facts, even if only that someone said it. Nowledge in turn is essential to wisdom.

Plato posited four levels of certainty of thought, imagining, belief, thinking, and the most certain, knowledge. He gave three minimum requirements for any belief to be considered knowledge: The belief, 1. must be based on adequate evidence. 2. must be internally consistent, and 3. doesn't contradict previously verified knowledge. **Plato's** requirement assumes that previously verified knowledge is accurate, but advances in science have shown that what was once considered verified knowledge may not be.

Averroes said that knowledge is "the conformity of the object and the intellect." **Thomas Carlyle**: recorded experience. **Immanuel Kant**, "organizing the chaotic things that we experience into a ordered world." **Einstein**, it's *understanding* information. **Alfred North Whitehead**: It's "knowing *how* things happen," .

Human history, according to **Voltaire** and **Pierre Bayle**, is a history of "crimes and misfortunes." For **Edward Gibbon**, its "crimes, follies, and misfortunes." For **Robert Ingersoll**, it's "slavery, injustice, brutality." For **Michael Bakunin**, history has been a perpetual and bloody immolation of millions of poor human beings in some pitiless abstraction, God, country, power of state, national honor. For **Malthus**, the histories of humans are histories only of the higher classes. For **Ambrose Bierce**, history is an account, mostly false, of events, mostly unimportant, brought about by rulers, mostly knaves, and soldiers, mostly fools."

This book is not about kings and wars. It is about what people thought they knew about their world and themselves. Throughout history, including to today, most humans have been consumed in a struggle to find food and shelter and have not had the time or ability or knowledge to contemplate.

We can only think in words and concepts we know. (That is, a child who has never been made aware of the concept of boredom, will never be bored.)
Most humans have been illiterate and ignorant of the world of ideas beyond survival.

In the first days of *Homo sapiens*, human knowledge was that of our primate ancestors, how-to knowledge, how to survive, how to find food, keep warm. Probably around 200,000 BC, a female primate birthed a child with a substantially larger prefrontal cortex than its siblings. This child, the first *Homo sapiens*, passed along such brain to his/her children who survived and reproduced more than others.

Homo sapiens also evolved other physical differences from their primate ancestors, a repositioning of the skull from the front of the neck to above the neck, the ability to walk upright, a change in the larynx that enabled better speech. The history of knowledge is the history of the ideas of a small fraction of humans who had the time and curiosity to study how the world works and thinks.

A few *Homo sapiens* began to be able to think better think and speak better than others. They prospered and reproduced. When they began to live in larger numbers, the clever ones of the tribe claimed a connection with powerful spirits who made every thing happen. They made up stories of where they came from. They ruled as they could explain what the spirits wanted. They were lamas, seers, oracles, shamans, rabbis, gurus, sorcerers, divines, holy men all called herein "priests"

Sometimes the priests' explanations were vague and ambiguous. Within the small community of thinkers, a few curious individuals sought to seek certainty regarding *how* things happen apart from priestly explanations. They began to see how some events caused other events. They began to see order in nature. They devised theories that gave more certain explanations than priestly explanations.

This book is principally a chronology of what humans thought they knew. Most people reach **Plato's** second level of certainty of thought, belief. People *believe* statements by others that make sense to them, plus what they can figure out for themselves by experience or reason. Statements by priests of a god's directives regarding human behavior were usually simply common sense rules to keep peace in the tribe or community. Books and theses have been written about virtually every statement written herein. Some concepts, ideas, like dark energy, abiogenesis, quantum theory, are only heard of and even less understood, by a minute number of persons. If there is any overall theme to this chronology, it is the progress of human knowledge from ignorance to superstition to reason

Priests: **David Hume** defined priests as "the pretenders to power and dominion, and to a superior sanctity of character, distinct from virtue and good morals." The first clever priests knew little of how things actually happened, but saw that their explanations gave them power over the people.

Diodorus Siculus of Sicily, a Greek historian, said, "The myths about Hades and the gods, though they are pure invention, help to make men virtuous." Throughout history, in the West, belief in the power and influence of supernatural spirits or gods was the norm. In any field of knowledge, like physics or biology, there are certain natural laws that govern *how* things work. One example: **Newton's First law of motion**, Inertia, "Every object stays at rest (or in motion as the case may be) unless another force (like a push or pull force) acts on it." Very simple. Very logical. Gods weren't involved.

The first scientists, called natural philosophers, did not know such natural laws. But, by trial & error, observing, and experimenting, saw relationships and one by one discovered the laws that governed how things worked.

Don't confuse how with why. How asks for the means or method of an event. Why asks for the reason or purpose. In simple terms, scientists advanced knowledge of how the world works through

discovering the natural laws and principles that govern how things work without divine (god) guidance.

Priests tell why things work; a god did it. Scientists/natural philosophers, simply persons who think, were opposed, often by violence, by priests, who realized that their power and authority would diminish if people learned that non-priestly explanations worked.

Natural philosophers began to see that there is order in nature, and that that man could discover those laws that objects obeyed. This chronology tells how the very few most able thinkers sought and discovered natural laws.

In time, natural philosophers began to specialize into those who studied how things worked and those who studied how people's minds worked. Some thinkers did both. Around AD 590, Bishop of Rome/ Pope **Gregory the Great** said, "Faith hath no merit where human reason supplies proof"

Thinking persons try to classify, categorize, & quantify relationships between objects & phenomena. False beliefs cluttered the advance of knowledge and were discarded when new beliefs worked better. Empiricists emphasize the role of sense experience in the quest for knowledge. Rationalists emphasize the role of reason based on reasoning from *a priori* values and from innate built-in abilities of the mind.

In 1931, **Bertrand Russell** wrote, "150 years of science have proved more explosive than 5,000 years of pre-scientific culture." This book seeks to give the essence of important ideas and events in the advance of knowledge. What persons say influences what others believe. So much of this book is what people said.

Great advances described herein are most often preceded by lesser related advances by other thinkers. Advances in scientific knowledge have been disproportionately Western.

Historians **Will** and **Ariel Durant** call the best scientists and philosophers "masterful individuals." The matters related herein are most detailed about America, then Europe, then non-Western cultures. Knowledge builds on knowledge so the matters related herein are told here chronologically. The spread of knowledge even among the few educated thinking persons, was extremely uneven. Communications among persons was only oral before writing, and then hand written. Some developments (i.e., tools, weapons, boats, plows, stirrups, food production, wheels, monotheism, sundials, democracy) developed independently in different parts of the globe and some appeared in one place and took hundreds or thousands of years to spread to locales even relatively close.

The communities of humans were widely dispersed and isolated. The Aztecs and Incas were unaware of each other. Pottery was made in Ecuador around 3100 BC but not in next door Peru for about 1,300 years.

For all of history, humans knew no history. Their world was a daily struggle to live. They were not dumb, just didn't know much. Some learned to communicate. The human scavenger of 20,000 BC had the same ability to think as the Ph.D of today. What is the difference? Knowledge of facts. The evolution from a primate with a large prefrontal cortex to modern humans took millions of years. **Jacob Bronowski** (1908-74), "Two traditions explain the ascent of man, analyzing the physical structure of the world, and studying the processes of life."

Around the world, numerous gods in different communities came to be thought of as having various supernatural powers. to explain natural phenomena. Then in the third century BC in the West, the concept of a greater god and then the greatest all powerful monotheistic God became the predominant supernatural concept. Different Western communities still had their belief in their monotheistic Gods.

The various civilizations, cultures, religions, in the Mid-East, came to dominate the world as we know it, militarily, scientifically, philosophically, technically, economically. Peoples in the Asian East can trace their communities back 8000 years, but did not develop as did the peoples in the West.

Along with gods of varying personalities came some people who questioned their gods. In the well known Epic of Gilgamesh, Gilgamesh asked why the Sumerian gods did not give people eternal life.

Similarly, in another Sumerian epic, *the Poem of the Righteous Sufferer*, **the sufferer asked why the Sumerian gods treated him, a pious man, so cruelly.**

As we herein relate, this question became the most important theological question in Western Civilization. This question came to be called *The Problem of Evil*. It is a simple and obvious logical question.

It simply points out the logical contradiction between a God who *could* and *should* alleviate the needless or gratuitous suffering of innocent persons but does not do so. After the *Poem of the Righteous Sufferer*, this question became important in the *Hebrew Bible* as *the Book of Job*. When **Paul** created Christianity its Scriptures declared **Jesus** as perfect, and the problem became a Christian problem. From the advent of Christianity onward, Christians have devised arguments to reconcile their perfect God **Jesus** with the suffering in the world.

Richard Swinburne (1934-), Brit, eminent philosopher in the *Oxford Companion to Philosophy*, wrote, "The Problem of Evil has always been the most powerful objection to traditional theism." **Maimonides**, the great Jewish scholar said the same. The Problem logically refutes the existence of Gods who could and should prevent suffering of innocents but do not do so. Pagan, Greek, Roman gods do not have this problem, nor do Buddhist, Shinto, or Confucian philosophies. The problem is not an *objection* to traditional theism; it is a *logical refutation*. The *Problem* first appeared as Sumerian 13 centuries before Christ. Then in the *Hebrew Bible*. Then with the advent of Christianity, it became a *logical refutation* of the Christian God.

There is a straight line from the Sumerian *Righteous Sufferer* to the *Problem of Innocents Suffering* today. We assert that this *Problem of Evil* should now more accurately and rationally be known as *the Problem of Suffering*.

Milestones in the History of Knowledge

600 BC, “Is anything permanent? Thales asked. Democritus said all matter is made of tiny bits, atomic theory.
530 BC, Ethical living was taught by Confucius in the East without a divine basis.
528 BC, Buddhism was founded by Siddhartha Gautama, an ethical doctrine, without a divine basis.
450 BC, Western history began to be described and explained by the Greek Herodotus
430-399 BC, Basic philosophic questions were asked by Socrates and Plato.
335 BC, Basic laws of logic and thought (plus Induction and Deduction) were taught by Aristotle
300 BC, Greek schools of philosophy. Epicurus’ Garden, Zeno’s (Stoicism), Aristotle’s Lyceum, Plato’s Academy.
AD 35-64, Christianity was created and organized by Paul based on stories about Jesus.
AD 425, Christianity was defined to the world, Original Sin was instituted by Augustine, Neo-Platonism evolved.
1085, Toledo’s huge library (& translators) with Mid-East, Greek, and Asian texts became open to Christian scholars.
1279, All the main doctrines of Christianity were described in *Summa Theologica*, by Thomas Aquinas
1450, The printing press system was invented by Gutenberg. It expanded knowledge to the middle classes.
1492, The Americas were discovered by Europeans. Columbus, & others, greatest increase in knowledge .
1517, Protestantism was founded by Martin Luther. It broke the Christian monopoly of Western religious thought.
1522, The world was sailed around by Magellan’s surviving crew (18 out of 270) They had sailed westward .
1532, Real Politik, How rulers realistically ruled, ruthlessly, deceitfully, faking piety, described by Machiavelli.
1543, The Earth was described as a small planet orbiting a star, not the center of the universe. Copernicus.
1543, The Human Body was accurately described in *On the Structure of the Human Body* by Andreas Vesalius.
1600, Earth is a magnet with North and South poles. William Gilbert. He was the first Brit to accept heliocentrism.
1608, The telescope was invented. Hans Lippershey, Dutch eyeglass maker patented it. Galileo built one.
1609-19, Laws of planetary motion calculated. Johannes Kepler, *Astronomia Nova*,. Planets orbit the Sun in ellipses.
1610-1633, The telescope showed that Earth rotates Galileo said Jupiter had moons.
1637, Modern philosophy, *Discours de la methode*. Descartes showed people could examine the world without a deity.
1651, Materialism. *Leviathan*, a strong government is necessary, Thomas Hobbes founded metaphysical materialism.
1687, Isaac Newton’s *Principia* showed mechanical, not divine, principles rule all motion, including gravity.
1689, *Treatises on Civil Government, A Letter on Toleration*. Property is sacred, John Locke
1710, Why does matter exist? Gottfried Leibniz asked. He devised arguments seeking to refute the *Problem of Evil*.
1733-1778, Voltaire, most influential person of the 18th century, debunked nonsense, hypocrisy, religions, and slavery.
1749, Evolution predicted. Georges Buffon, *Historie naturelle*, first Western history not based on the Bible,
1751, *Encyclopedie*, the book of the Enlightenment. Denis Diderot, Jean D’Alembert, & many more. Reason rules
1755, Arguments for God challenged. Hume named 3 kinds of statements, tautologies, meaningful, and nonsense .
1755, *Dictionary of the English Language* standardized spelling. Samuel Johnson: Catholics made thinking a sin
1776, Economics became a science with the *Wealth of Nations*. Adam Smith noted the factory system & *laissez faire*.
1778, Chemistry developed from qualitative to quantitative, a revolution led by Antoine Lavoisier
1797, Vaccination for small pox introduced in Europe. Edward Jenner proved mild cowpox prevents smallpox,.
1808, Atomic theory put into chemistry. John Dalton developed the atomic theory and the law of partial pressures.
1821, Electric “fields” were discovered, electricity could cause motion; so an electric motor Michael Faraday
1848, *Communist Manifesto* “A spectre is haunting Europe, the spectre of communism.” Karl Marx
1855, Electricity summarized and explained by James Clerk-Maxwell. He used *Faraday’s lines of force*.
1862, *Germ Theory* discovered. Louis Pasteur. In 1856, he discovered pasteurization. In 1884 a rabies vaccine.
1859, All animals evolved from earlier species by Natural Selection. *Origin of Species* by Charles Darwin
1900, *Laws of Heredity* (Mendel) become widely known as they merged with gene mutations of de Vries.
1920, The existence and significance of one’s unconscious became widely known. Sigmund Freud
1905-15, Special and General Relativity Albert Einstein limited Newton’s physics.
1924, Galaxies beyond our Milky Way were discovered. Edwin Hubble and Martin Humanson.
1927, That the universe began when a single spot exploded was proposed by Georges Lemaitre.
1942, Antibiotics, penicillin became known. Millions saved. Alexander Fleming had discovered it in 1928.
1961, The nature of electromagnetic force was discovered by Michael Faraday and James Clerk-Maxwell
1962, Double Helix structure of cells discovered by Rosalind Franklin, James Watson, and Francis Crick
1965, Cosmic Background Radiation (CMB) was detected. Powerful evidence for the *Big Bang* theory.
1974, *Standard Model of Particle Physics* was published. It described 3 of the 4 known fundamental forces.
1988, Rational arguments for the Christian God were abandoned by Pope John Paul 2
1989, The World Wide Web and the first web browser were invented by Tim Berners-Lee. #

From Creation to the Hebrew Bible and the 10th Century BC

13.8 Billion years ago The universe began: The best current evidence is that about 13.8 billion years ago there was an explosion from a single point now called *The Big Bang*. What caused it. We don't know. The first matter to appear were protons and electrons. A few hundred thousand years later hydrogen appeared, then protons and electrons combined into atoms. One proton and one electron combined into one hydrogen atom. This was called "The Great Recombination". Suns/stars coalesced by gravity from the atoms. Atoms then combined with other atoms to become elements like oxygen and carbon. For example, hydrogen atoms fused together to become helium. Or, two hydrogen atoms combined with one oxygen atom to become one water molecule, and so on. Today, over 74% of the known universe is still hydrogen atoms. (See 1939-Physics-**Hans Bethe** for how sunlight is made in stars.)

Prehistoric dates are estimates, unknown until 19th century

Creation Theology: The *Bible* has two accounts of creation. One, God created the universe and night and day on day one, the sun on day four, man on day six. The other, God made man from the dirt of the ground. Over 120 creation myths around the world have been found. Most are long gone.

The only "life" on Earth for 3 billion years was one-celled bacteria organisms

Our Earth: Nine billion years after the universe began, 4.6 billion BC, matter orbiting our Sun/star coalesced by gravity forming our Earth. At first, Earth was entirely molten. Elementary particles joined and made atoms which made elements which made molecules which made substances like water or minerals or gasses. Earth's surface cooled and solidified into plates.

About 4 billion BC, a Mars sized object being pulled by gravity toward our Sun collided into Earth and the resultant debris coalesced into our Moon. It then began to orbit Earth.

For about a billion years there was no life on Earth. Then one-celled bacteria, life, appeared. How? We don't know. Then, for 3 billion years the only life on Earth were a one-celled bacteria organisms. (An "organism" is an individual animal, plant, or single-celled life form.) Then for 200 million years, ocean microbes evolved to produce oxygen via photosynthesis, the Great Oxygenation.

c. 800M BC Biology: Multi-celled organisms evolved In oceans and evolved into different multi-celled forms, plants. The ability to generate electric signals in a nervous system appeared. The ability to generate electric signals was a key innovation in the evolution of the nervous system.

600M BC to 530M BC, a 70M year *Cambrian Era*. Major animal groups, vertebrates, invertebrates evolved. Some creatures evolved legs and left the oceans.

444-66M Five mass extinctions killed c70-95% all living life.

250M BC Geology: One continent, Pangaea, slowly split into the present continents which drifted to their current locations. Primates with opposable thumbs evolved during 85-55 million BC. .

66M BC Around 66M BC, a 111 mile wide asteroid crashed into Earth north of the Yucatan. Some scientists said it spread dust blocking sunlight which retarded plants which starved most animals, including dinosaurs. An equally persuasive theory is that volcanic eruptions erupted dust that blocked sunlight.

18M BC Biology: In America, 19 species of horses (and their kin) lived c.18-8 million BC. One horse species, *Equus*, walked west to Asia on the dry land between Asia and Alaska and evolved in Asia into the modern horse. The other horse species in America died out due to the Ice Age.

17M BC Hominid or Hominin

Biology, current definitions: (Definitions and classifications of *hominids* and *hominims* and their subgroups have changed over time). Today, *Hominid* is the group of all Great Apes, modern & extinct, namely, modern humans, chimpanzees, gorillas and orangutans and their immediate ancestors.

Hominims evolved from *Hominids* in Africa when the climate turned dry. They are a subgroup of *Hominids* consisting of the genus *Homo*, including modern humans, and all our immediate ancestors (including members of the genera *Homo* and chimpanzees (brain size about one third of today's *Homo sapiens*). So chimps are our closest living species. *Homo* genera walked upright, their skulls on top of the spine, not forward like apes. *Homo* species made tools, had a larger brain, developed language. *Homo sapiens* are the only surviving species of the *Homo* genera.

7M BC First humans evolved in Africa *Hominims* are first known to exist in Chad around 7M BC, brain size c.300-370cc. Then *Ardi* in Ethiopia 4.4 million BC (walked upright on ground, used four limbs in trees, brain size c.370cc), Then *Homo australopithecus (Lucy)* in Ethiopia c.3.3M BC (brain 700cc, 43.5" tall, c65 pounds), were the first *hominims* to walk erect. Then *Homo habilis* lived 1.9M -1.4 million BC, brain -550-687cc. *Homo habilis* made clothing, spears, and knives of flint. Remains of this period are skimpy.

1.9M BC First *Hominims* known outside Africa: in Caucasus mountains, had simple stone tools, no hand axes or fire.

1.9M-110K BC *Homo erectus pekinesis* / "Peking man" lived in China, brain 600-1250cc, hunted large animals in groups, possibly first to use fire.

Homo erectus reached Timor Island in Indonesia, so they were presumed to have some kind of boat.

1.6M BC *Homo ergaster*, S. Africa, were the first *Hominims* with long striding legs, facilitated walking and running.

1.5M BC In 2025, archeologists found carved bone tools in the Olduvai Gorge in northern Tanzania.

700,000 BC Paleolithic Age: Paleo=old, lithic=stone. *Hominims* used stone tools, foraged, knew medicinal plants. The most important prehistoric technological advance was control of fire, to heat, cook, provide light, smelt, keep predators away. Men hunted, women cared for infants, cooked, made clothes.

370,000 BC Anthropology: *Neanderthals* evolved, stockier than current *Homo sapiens* but with either a common ancestor with *Homo sapiens* or were a sub species. They migrated from Africa and roamed over Eurasia, They made complex weapons, buried their dead-possibly a sign of belief in an afterlife. Wooden spears used at Schoeningen, Germany. Average hominim life span c20 years.

7 million years of Hominids (ape-like), then c.200,000 BC *Homo sapiens*, Modern Man, evolved Biology: *Homo sapiens* evolved from one *hominim* c200,000 BC in current Botswana. Some paleo-anthropologists (students of early humans) say it was 150,000 years earlier in Morocco. How evolve? Due to a random genetic mutation, a *Hominim* mother had a baby with a much larger neocortex, that part of the brain that processes higher order cognitive functions (language, ability to conceive of abstract concepts). This one baby was the first *Homo sapiens*. He or she had offspring with his or her larger brain. The offspring were able to hunt and survive better, so they prospered. About 97% of modern man's DNA is the same as chimps. While chimps have a common ancestor with modern humans, modern humans' neocortex is 80% of its brain (c1,370cc) but only 50% of a chimp's. Language and other forms of symbolic communication was the start of being human.

200,000 BC Biology: Modern human babies, like other primates' babies, are helpless for a long time, burdening their mothers. They survived and reproduced. Their progeny, due to their larger neocortex (about same size as today) helped them prosper. Their larger brain and a repositioning of the larynx enabled them to speak and better cooperate in hunting and to make better weapons than the *Neanderthals* they later met in Europe.

The history of knowledge has two main areas, natural laws and the human mind In the history of knowledge, two principal areas have evolved, the discovery of natural laws governing nature and the less discovered area of how the human mind works. When the human mind first evolved, that is, when the neocortex first greatly enlarged and a more versatile larynx evolved, humans knew only what their primate ancestors knew, how to survive, how to find food and shelter. The new cortex and larynx then gave humans the ability to better understand their surroundings and to better communicate than their ancestors. Control of any group became divided between those who could physically dominate the group and those who could intellectually dominate it.

Dates are approximate Anthropology: *Homo sapiens* thus first evolved after the Earth was about 4.6 billion years old. The first good evidence of such modern humans hunting, rather than scavenging, was c.100,000 years ago. About 50,000 years ago modern humans migrated out of Africa to all over the globe and evolved into different physical types which we now call races. Humans spread around the world before they developed writing.

All *Homo* species except *Homo sapiens*, modern humans, died out. The *Homo sapiens* of 20K BC are physically identical with humans today; except modern humans are taller. The first *Homo sapiens* were just intrinsically as smart as modern humans today. But what they *knew* was infinitesimal compared to today.

Cultural evolution leaves no fossils Biology: Psychologist **Scott Kaufman**, "The smartest person to ever walk this Earth in all probability lived and died herding goats on a mountain somewhere, with no way to disseminate his work globally even if he had realized he was super smart and had the means to do something with his abilities." **Jacob Bronowski:** "The real content of human evolution is cultural changes" in behavior which leave no fossils

Before cultures and civilizations developed, humans lived in tribes and were ruled by the strongest person,

like their primate ancestors. Also like our ancestors, cooperation among tribal members continued. The leader selected his mates; led the hunt; and he (likely a he) led the defenses and fights against foreigners.

Clarence Darrow, "The beginnings of the state can be traced back to the earliest history of the human race when the strongest savage took the largest club and enforced his rule upon the other members of the tribe." *Homo sapiens* made tools to make tools, used spears, sharp stones, foraged, and hunted for food. They interbred with Neanderthals to a minor degree. Cooperation in the family, then tribe, benefitted all & required rules of conduct. (Neanderthal technology included stone tools, fire, cave hearths, simple clothes, boats in the Med, medicinal plants, treating injuries, storing food, roasting and boiling.)

74,000 BC Toba, Sumatra, largest known eruption, 6 year worldwide volcanic winter, reduced humans to a few thousand.

70,000 BC Anthropology: Curtis Marean, Paleoanthropologist, A key trait of *Homo sapiens* that allowed them to leave Africa was their ability to cooperate with unrelated persons, hyperprosociality.

60,000 BC First known art: humans decorated ostrich eggs and seashells (found in a cave in South Africa in 2010).

50-30K BC Paintings on cave walls and carvings from the Upper Paleolithic Age are thought to represent religious ideas.

35,000 BC First known evidence of counting, 29 notches on a fibula, in Swaziland. Tools show how-to knowledge.

110,000-12,000 BC Last Ice Age: Neanderthal Man spread across Eurasia. Their bones were first found in the Neander *tal* (valley) in Germany. His brain was same or even bigger than Modern man's. But late Neanderthal tools were little better than early Neanderthal tools, i.e., little intellectual progress. Neanderthals had plant medicines, crude sculptures, buried their dead with objects, presumably to use in the afterlife. They hunted in groups.

40,000 BC Great Leap Forward: The arrival of Cro-Magnon Man, the earliest Modern humans, in Europe continued what **Jared Diamond** calls *The Great Leap Forward*, lasting tens of millennia. Cro-Magnon humans evolved after millions of years of Hominims. They hunted (but their diet was mostly plants), made multi-piece tools, had oil lamps, musical instruments, spear throwers, traded, painted sophisticated cave paintings in North Spain and South France. The first known cave paintings have been found on the island of Sulawesi, Indonesia, possibly dating to around 44-35,000 BC. In a cave dated to 40,000 BC was found a small figure of a half human half lion showing humans could imagine the impossible. Of utmost importance, modern humans evolved the capacity for abstract thought – the ability to imagine things that hadn't yet happened.

Lev Vygotsky: "We [can only] think in concepts and words we know."

Cave paintings indicate consciousness Cave paintings have been found in Southern Europe dating to around 30,000 BC, generally of animals. Bow and arrow and shamans also appeared in cave paintings in Veltora Gorge, Eastern Spain. Modern humans began to think in terms of symbols, enabling art and language to transmit thoughts. Cave paintings told stories and thus were the first known "writings".

Cro-Magnon humans had dugout canoes, clothing, huts, needles, awls, rope, bow and arrow. This cultural revolution, shown by art, resulted from their large neo-cortex that helped them talk and think.

Upper Paleolithic Age carvings may have indicated religious ideas. Neanderthals, who had not progressed technologically for c100,000 years, died out, possibly through contact with Modern man.

Lucien Levy-Bruhl, "For the primitive mind, everything is a miracle, or rather nothing is; and therefore everything is credible and there is nothing impossible or absurd." (In the 21st century, with quantum electrodynamics, relativity, quarks, and electromagnetism, some people still believe in miracles.)

Civilizations evolved from cultures. Anthropology: Cultures evolved into civilizations (means city dwelling). Modern humans began the first civilizations. Civilizations in any given locale were enabled by a hospitable climate, water, a diversity of plants and animals, and with genetic differences (skin color, physique). Customs and taboos evolved.

"Customs are the wisdom of society." **Will and Ariel Durant**, "Customs are the wisdom of society after generations of experiment in the laboratory of history." Certain inventions / developments which enabled civilizations to develop occurred before writing about events, i.e., history. Humans saw patterns in nature, the regularity of the some stars and seasons. Tools and fire (500,000 BC), burial (c.. 70,000 BC), art (c.30,000 BC), farming (c.11,000 BC), domesticated animals (c. 10,000 BC), weaving (c. 6,500 BC), boats, weapons, and pottery (c. 6,000 BC)

Fire Prehistoric tribes still exist Use of fire changed life completely. Fire brought peoples together in communal dining and shelter. Some hunter / gatherer / scavengers remained so into modern times in isolated remote regions of Southeast Asia, Australia, South America, the Arctic, and Africa.

The *Bakhtiari* nomads in remote mountain regions in Iran today live as they did 4,000 years ago. Settled agricultural communities had technologies that enabled natural philosophy / science to begin.

Beliefs in gods All cultures developed creation myths, where they came from. Beliefs in spirits, invisible, inaudible, untouchable, powerful, as described by priests, pervaded. The first priests were most likely the cleverest members of the tribe. They found that they could influence the tribe by telling the tribe that there were invisible entities, spirits, gods, that caused various physical phenomena and told how to deal with such entities, namely through themselves. The idea of magical entities/ gods came long before "history."

40,000 BC How did religions begin? How did religions begin?: **Voltaire**, "Inhabitants of a village, little better than savages, see their food perish, a flood wash away their abodes. Who has done this? Not one of their village, as they all were affected. It must be some secret power, who therefore must be appeased. Religions developed out of the myths regarding gods. How? The same way they appease others; by making some small present. There is a serpent in the neighborhood. They put milk near his cavern. From then on he becomes sacred. He is invoked when they are at war with another village who have their own protector."

The priests said that there were supernatural entity with great powers inaccessible to humans' senses but attainable to humans through them. Religions have dogmas, particular sets of beliefs regarding the world. They are subsets of supernaturalism. Some supernatural belief systems like religions require strict obedience to rules of thought and behavior. Some supernatural belief systems only require their adherents to perform certain rituals, although some rituals may be extremely onerous.

How did religions begin? **Prodicus of Ceos** (c.465-395 BC), Greek, a leading sophist: Early humans worshiped those things that kept them alive. **Democritus**: "Men invented gods as they were frightened and excited by the heavens, shooting stars, lightning." **Lucretius**: "fear." **Baron d'Holbach**: "Ignorance and fear created the gods, and priestly impostures made them terrible." **Will Durant**: "fear". **Pierre Bayle**: "fear and ignorance."

40,000 BC Religions: **William Lecky**: "Terror is everywhere the beginning of religion." **David Hume**: "The first ideas of religion arose from a concern with the events of life, and from the incessant hopes and fears which actuate the human mind, fear of the unknown. **Hobbes**: "fear of invisible powers." **Samuel Johnson**: "Fear first in the world made gods." **Robert Owen**: "All the religions of the world have been founded upon the ignorance of mankind." **Lucretius**, (67 BC) Fear of death was the first thing on the earth to make the gods."

Bertrand Russell: (1872-1970) "Religion is based . . . mainly on fear of the mysterious, fear of defeat, fear of death. The earliest religions were fertility cults." **Stendhal**: "the fear of the many and the cleverness of the few." **Petronius**: "Fear of the hidden forces in the earth, rivers, oceans, trees, and sky." **Sigmund Freud** (ref. 1900), *The Future of Illusion*, "Religious ideas sprung from the same need as other achievements of culture: the necessity of defending itself against the crushing supremacy of nature."

Greek gods Greek gods: **Georges Grube**, Any entity we see in the world, not born with us and which will continue after us could be called a god, and most were. Christians & Jews say God exists; He is power, good, love, etc.,

Priests and religions vary Priests claimed to know about gods whom they said controlled events. Priests gave divine (god-like) explanations. Their perceived knowledge gave them power. Different creation myths and belief systems (described by priests) developed in different cultures around the world. Access to supernatural entities has been the most common device that rulers have used to claim authority from the start. (See 1532).

Priests controlled thinking Social Control: Priests said that the gods ordered certain rules of behavior. Priests told people how to appeal to the gods. At some point, the concept of sacrifice / obedience may have developed when priests ascribed the human trait of trading to a god. The god would accept a sacrifice / gift in exchange for giving success in the hunt or other activity. There was an advantage to the priest to proscribe rituals for such gift giving, in which he was the middle-man between the people and the god, taking a commission so to speak. Religions put concepts of morality, happiness, and proper behavior beyond common man's knowledge and control. Every advance in scientific knowledge has replaced some priestly explanation. Religions resisted the advance of scientific knowledge.

40,000 BC How we think: Modern neurological studies and evolutionary biology have suggested that humans were (and are) "hard wired" through millennia of experiences before the advent of rational thinking to believe in supernatural causes of natural phenomena. Belief can be more compelling than rational "truths." Believing is much easier than thinking. **Schopenhauer**: "Man can't think, only believe."

Priests gave their communities understanding and comfort from the things they feared. Priests provided

Priests gave comfort	a coherent world view, a set of beliefs that encouraged group cohesiveness, which assisted a group's survival. People thought of themselves as part of a group, not as an individual apart from their group. The concept of self is relatively recent in world history. The oldest argument for the existence of a god is the inferential by default argument, i.e, something beyond our knowledge must have caused X, it must be a god.
Concepts of spirits preceded writing	<u>Many concepts we think about today arose 10-20,000 (or more) years before writing existed</u> , like a powerful invisible spirit world and speaking with it, obedience to a powerful spirit, use of symbols, morality, patriarchy, good, evil, trade, ritual sharing of food, witchcraft, measuring time, regulating incest, an afterlife, and transmitting social status by heredity. <u>At best we make educated guesses about such pre-historic matters based on finding and examining fossils and ruins.</u>
Religion hijacked morality	Religion is magic: Arthur C Clarke (1917-2008), "Any phenomenon sufficiently beyond one's current experience is indistinguishable from magic." "The greatest tragedy in mankind's entire history may be the hijacking of morality by religion. . .The rash assertion that God made Man in his own image is ticking like a time bomb at the foundations of many faiths. If there are any gods whose chief concern is man, they cannot be very important gods. Belief in God is apparently a psychological artifact of mammalian reproduction."
"Faith"	Richard Packham (1933-), American philosopher, described <u>four kinds of faith</u> : 1. <u>Necessary, unavoidable faith</u> (justifiable reliance): Example, The sun will rise tomorrow. 2. <u>Harmless faith</u> . (often religious), not verifiable. Example, Granma is now with God. 3. <u>Faith, a religion</u> . 4. <u>Dangerous faith</u> . (A belief without evidence) Examples, Prayer heals; Males are superior to women.
30,000-20,000 BC	<u>Numerous small Paleolithic figurines of corpulent women</u> have been found across Europe and the mid-East, given the names <i>the Venus of Laussel</i> , <i>V. of Hohle Fels</i> , <i>V. of Willendorf</i> , <i>V. of Lespugue</i> , <i>V. of Kostenki</i> , <i>V. de Sirenli</i> , <i>Sarayk Venus</i> , <i>V. of Dolni Vestonice</i> . The most famous figurine is of a nude woman sitting on a throne flanked by jaguars, apparently giving birth as a baby's head appears between her legs Sophisticated paintings of horses were found in the Chauvet Cave, SE France. One modern theory is that their physiques were a symbol of survival as many were carved during an ice age.
18,000-10,000 BC	<u>Anthropology</u> : Magdalenian men, hunters of Western Europe, had harpoons, followed herds, used jewelry, painted cave paintings, lived in tipis, carved animals in South France. Dogs were the first animals tamed.
Dry land from Asia to Alaska	<u>Glacial ice sheets receding</u> . The last Ice Age concentrated snow and ice at the poles, so lowered sea level, left dry land from Asia to Alaska, Japan, and Sarawak, and New Guinea to Australia. Modern man, caribou, musk ox, and mammoths walked from Asia to Alaska and further south. A recent underwater archeological dig in Florida found evidence of humans dating to 14,550 BC. Other digs have indicated that people were in Peru by 22,000 BC, the Yukon by 12,000 BC.
Farming	Humans killed off most large animals, in particular, mammoths. <u>Farming</u> : The Zahara / Sahara (means desert) was fertile. Some hunter/ gatherers found they could grow food and tame captured animals, so didn't have to follow a herd. <u>Melting ice caps raised global sea level 325 feet and flooded the land bridges south and east of Asia.</u>
Blood groups	All South American natives before Columbus were only in blood group O. North American natives were in blood groups A and O, proving that a second migration from Asia with groups A and O migrated only to North America. This became known only after 1902 when blood groups were identified.
11,000 BC Cultural "history" began	<u>How-to knowledge</u> : The Neolithic (New Stone) Age began. Beginnings of agriculture, use of stone tools, plants and seeds. With every development of language, Humans could intensify and develop traditions of taboos, myths, restraints and ceremonies. Language organized consecutive thought. The ability to communicate with symbols was the most important mental attribute that humans had. Language was needed for religious thought. Neolithic Man associated the Sun and snakes in decoration and worship and left evidence of sacrificial practices. Reed boats were used in Azerbaijan. Every food, plant, and animal now important <u>developed during the Neolithic Age, long before writing.</u>
9000 BC Slavery	<u>The concept of property</u> also predated history. <u>Men owned women and slaves</u> in almost all settled societies. Hunter/ gatherer/ scavengers, unschooled in many respects, had an encyclopedic knowledge of their world.
Emmer wheat	<u>Farming</u> : <u>In the Mid-East, a random genetic mutation</u> made a new hybrid form of wheat, Emmer, with a large full head of seeds. Then another fuller seeded hybrid appeared, but it had to be planted, as it did not blow in the wind like earlier wheat. Wheat pollinates itself. So Man settled and planted it, but did not abandon hunting and gathering. Goats were domesticated.

9000 BC Gobekli Tepe	<u>Man-made structures: Gobekli Tepe, at Urfa, S.E. Turkey. 100s of clean cut limestone pillars, up to 18 ft tall, in several stone rings, with carved bas reliefs of gazelles, snakes, foxes, boars, one human, a woman at the top, built by nomadic hunter gatherers. There were no nearby cities or burial sites. It predated pyramids and stone rings like Stonehenge by c. 6000 years. It was lost to history until 1994.</u>
9000 BC Jericho	<u>How-to knowledge: Man became a shaper of nature, not just a predator / scavenger. The oasis of Jericho was built, ten acres big with c.3,000 people, just north of the Dead Sea, based on a great spring near the Jordan and was a source of salt. It was walled to protect against marauding nomads. People ground grain, had ovens, and houses of sun-dried bricks. It was the first walled town known to modern man when found in 1868. Flax/ linen, an ancient crop, grown for rope and cloth, was the chief textile of Europe until cotton replaced it in the 18th century. Cotton needs a warm climate. Towns grew along trade routes</u>
Farming 9000 BC	<u>Farming developed independently in at least four locales around the world unknown to each other with different crops. 1. The Americas, corn, beans, potatoes, peppers. 2. Europe-Middle-East field agriculture, depending on reproduction by seed grains, especially wheat and barley. Bread of differing grains was the staple diet and remained so until modern times (wheat for the rich, rye, barley or oats for the masses.)</u>
Bread was the staple diet	3. <u>Monsoon Asia /Pacific</u> islands, propagation of crops by transplanting offshoots from a parent plant, such as rice, millet, and root crops dominated, and 4. <u>West Africa</u> , millet and yams.
Cultures & behaviors change faster than biological features.	Farming spread slowly and unevenly, depending on climate and ease of travel. A few remote cultures today have not advanced beyond crude agriculture or hunting. A Peace Corps volunteer who spent a year with a tribe in the Amazon forest was asked if he told the natives that he came from a country to the north called the United States. He said, "They never heard of Brazil."
7500 BC- 5600 BC Catal-Hoyuk	<u>A proto-city, population c. 5-7,000, flourished around Çatalhöyük / Catal Hoyuk in Anatolia, a source of obsidian. It was one of few Neolithic likely-matriarchal cultures. There were no apparent public or religious buildings. There were many layers of buildings, no streets, houses had one hole in the flat roof for ventilation and access to the house. Rooftops were the streets. but no writings of the time were found. The dead were buried in pots in the village, sometimes with objects presumably for an afterlife.</u>
Burial	Burial of the dead is thought by most to be evidence of belief in supernatural entities. A god is not necessarily inferred by an afterlife. Burial with objects that would be useful in the next life and appropriate to the status of the deceased was a universal practice. Catal Huyuk's ruins were first unearthed in 1958. A scrap of woven hemp found at Catal Huyuk is thought to be the first known woven textile.
6500 BC	<u>Farming: In the Mid-East, family groups developed into villages for protection and to cooperate in the hunt. As settled communities developed, the concept of personal property developed to include territory. Humans formed logs or stones to build shelters, a great step intellectually.</u>
	<u>Farming, even before the plow was invented, produced ten times more food with less work, permitting the population to increase and provide surplus food for non-farmers.</u>
6000 BC	<u>Technology, How-to knowledge: By 6,000 BC, some groups had boats, woven cloth, looms, potter's wheels (before vehicle wheels), oil lamps, bows and arrows, spears, harpoons, grindstone, sailboat (Iraq), ax, metal tools, copper, iron (only from meteorites), flint sickles (a great technological advance).</u>
Farming exploded population	<u>Meso-America: Cultures, if not civilizations, of farmers developed in Meso-America as well as Eurasia (without plows, as plows needed draught animals). More food from farming enabled the world population to rise 17-fold from c.8,000 BC to c.4,000 BC. In Mexico, natives domesticated corn. The increase of food enabled the rise of sophisticated civilizations, Toltec, Olmec, Aztec, then Mayan.</u>
Gods/ gods	<u>Voltaire wrote that at the "dawn of reason, many nations had no other god than their masters, their lord. Adonai with the Phoenicians, Baal, Milkom, and Adad, with the Syrians." This was why they looked upon their lord as a divinity. And the Jews revered Moses/Moshe, Jeremiah, Amos, and St. Stephen equally.</u>
	<u>Voltaire wrote that the Jews imitated the practice of the Arabs and the Egyptians of circumcision and often adored the Baal and Belphigor of their neighbors. He said that that the first communities were theocracies, "for as soon as a nation has chosen a tutelary god, this god had priests; who reign over the minds of the people, they cannot govern except but in the name of God . . . They retell his oracles, and by express order from God that everything is preformed.</u>
Hunting to farming was most basic human revolution	<u>Anthropology, William H McNeill: historian (1917-2016). The change from hunting / scavenging to farming was the most basic of all human revolutions. (Metallurgy next), c5,000 BC in Persia / Iran. The only "inventions" were primitive hunting/fishing gear (and perhaps a kiln.) Hunters became herders, daily seeking new pasture. Crude pottery was made. (more McNeill 650, 815) (See 3500 BC-Plow)</u>

5000 BC	Civilizations had shrines / temples to gods from their start. The settled communities can be considered <u>communities of obedience</u> (with slaves) where priests / gods with supernatural powers ruled, as opposed to nomadic communities which were <u>communities of will</u>, where the chief is more or less voluntarily followed. In communities with gods, priests were powerful as they spoke with the gods. They used ritual and other reinforcing techniques to perpetuate their control. <u>Priests involved themselves into all aspects of Man's life</u>; they instructed how to live, whom to fear and kill. Apart from how-to knowledge, myths of the tribe were the only "knowledge" passed down.
Social control: Priests, and kings, controlled all knowledge	<u>Priests, invoking a god, and a ruler (king / pharaoh/ warlord) controlled the people.</u> In the beginnings of civilization, in all known cultures, they were the same person. <u>They dictated and controlled all "knowledge."</u> <u>The temple system</u> with its priests was the nucleus and the guiding intelligence about which the Mediterranean ("Med") primitive civilizations grew. Temples were the repository of knowledge and tradition, on how to live one's life and a binding power to keep the community together. This or that god commanded one to sacrifice, worship, act, according to certain rules, .
5000 BC	"Civilizations" evolved from "cultures" first in the irrigable river valleys, the Nile, Indus, Tigris-Euphrates (Sumer), and Yellow / Yangtze in China where a surplus of crops (due to farming based on irrigation, a community activity) could feed the non-food producing priestly / ruling and artisan classes. A denser population and differences in abilities (particularly military abilities) led to social classes, a governing structure, and more formal rules, secular and sectarian, for behavior and the specialization of labor, artisans and craftsmen, who developed technologies, i.e., "civilization."
Prehistoric event dates were unknown until the 19th century	All prehistoric events and beliefs noted so far were totally unknown to modern Man until the most recent micro-moments of Earth's existence. The only science" in the modern sense was astronomy (without a telescope) and very basic arithmetic used in commerce. Pre-historic "science" even close the most basic modern science was unknown. History, like creation myths, was passed down orally. The word <i>prehistoric</i> was not used in the West until around 1850. <u>Sumer, the first known "civilization,"</u> was discovered only in the 1850s. <u>Mayans</u> 1840s. Indus Valley civilization 1820s. <u>Minoans</u> 1900, <u>Machu Piccu</u> 1911. <u>Peking Man</u> 1923. <u>Catac Huyuk</u> 1958. <u>Gobekli Tepe</u> 1994. <u>Homo naledi</u> 2013.
Dates of discoveries	
Priests kept the peace	<u>Priests told people how to gain a god's favor</u> for a good crop, or success at the hunt, or how to qualify for the afterlife; "Don't kill your neighbor, don't steal, etc." <u>Priests may well have known that what they were saying had no basis but that it was useful to keep order and control of the group.</u> <u>Priests' commands were generally simply common sense rules</u> that kept peace, but with the added authority of a supernatural being who could punish the disobedient. Sumer's chief god was An/Anu, god of the sky, next was Enlil, god of the storm, then Earth goddess Ki or Nintu, then Enki, lord of the creative forces of the Earth. The gods determined who were rewarded after death.
The city god owned everything.	<u>Temples:</u> In the Mid-East, the city was the property of the city god. Temples were a god's earthly home and the storehouses of grain. Gods owned the large irrigated fields. Priests administered them and recorded the surplus of agricultural products to support themselves and artisans. <u>Temples were dedicated to one god.</u> More refined and varied beliefs in gods developed. Rich persons were buried with gold and silver ornaments for the next life.
5000 BC	<u>Writing:</u> of amounts, like a number of scratches on a bone, long preceded writing of language. Primitive proto-writing, pictographs (representations of objects, like a grain or particular animal) made with a stylus with a wedge shaped point in soft clay, developed in Sumer city-states in Babylon, a small kingdom in south Mesopotamia (<u>between</u> the Tigris and Euphrates rivers, current SE Iraq.). <u>Each symbol stood for a word, so one had to remember many symbols (like Chinese characters).</u> <u>Pictographs then simplified</u> from representations of objects into symbols for syllables / sounds.
Small farming settlements developed into city-states	<u>The first evidence of city-states that has survived is in Sumer</u> in Southernmost Mesopotamia (South Iraq) in the Tigris-Euphrates valley. It had cities of Eridu, Nippur, Ur, Uruk (the first large walled city (the home of Gilgamesh), possibly c50,000 population), Assur, Umma, Kish, Lagash, and other cities' origins are unknown. Sumerian "cities" differed from Neolithic villages in that the use of irrigation required community cooperation. These city-states were the basic units of Sumerian civilization. Sumerians had sailboats (with push sails, sailed only with the wind), wove baskets and cloth.
Life in the Mid-East	<u>How people lived:</u> Dogs, sheep, and pigs were domesticated by c.8000 BC, the cow by c. 6000 BC. Copper and obsidian (glassy lava) were used in Western Turkey. (Copper as a pure metal is soft.

Sumer is southern-most Iraq, the earliest known civilization,

Some people then believed that there was a vast body of water within the Earth that nourished the Earth, easy to believe when wells could be dug to get water.

Mesopotamia means the land between the Tigris and Euphrates rivers, basically modern Iraq, Babylon was an ancient city on the lower Euphrates in southern Mesopotamia, 53 miles south of modern Baghdad. The name Babylon comes from an ancient word meaning “the place where the gods came to earth.” Sumer, the southernmost part of Mesopotamia, is the earliest known civilization. It became part of Babylonia. By 3500 BC, Sumer had developed writing, the wheel, sailboats, and irrigation

5000-4000 BC Sumerians sailed / rowed, plundered when they could, traded goods, Sumerians were the first merchants / traders to use balance scales. Oars were more reliable than sails on the Med. Rowing required slaves / oarsmen. Sledges and pack animals were used to move cargo. The wheeled cart wheel was not yet invented. A vehicle wheel is part of a system. A vehicle wheel system required roads.

Sumer Sumerian priests taught the inequality of humans, that Man had been created expressly to free their numerous gods from having to work. humans were thus obliged to work ceaselessly. The priests said that their first duty was to attend to the gods, i.e., ceremonies, sacrifices, then to instruct the people as to what the gods wanted. The community arose around the altar of seed-time sacrifice. Before writing, the spread of knowledge was oral, simple, with sundials, the arch, and a legal code. The first writings recorded trade transactions

Farming was probably women’s work. Men hunted, and later, when they tamed sheep, goats, or cattle, became herders. Women were the property of their fathers, then their husbands, then their sons.

Med cultures In all cultures around the Med, there were many gods, many taboos, many beliefs regarding the gods. As farming developed, worship of gods associated with the hunt (gods of nomadic hunter/gatherers) was supplemented by worship of gods and goddesses linked with farming success, mother Earth, rain, Sun.. the temple community organization helped Sumerians create conditions that developed civilization,

4000 BC Animals domesticated: By 4,000 BC, the horse (Ukraine), the water buffalo (China), and the donkey (Egypt), were domesticated. Man learned to ride horses, enabling nomads to become warriors/thieves, in hit and run forays against settled communities. Horses became very important in trade and war.

Egypt had many gods. Egyptian civilization: The earliest Egyptian records indicate Egyptians had a god-king, a pharaoh, numerous gods; the three main gods were, Ra/Re (Sun god), and brothers Osiris and Set. Egyptians mined and smelted copper ore in the Negev desert, used papyrus for writing. How to make papyrus was a state secret. (Papyrus is the pith of the stem of a plant in the marshes of the Nile delta).

Egypt is the Nile and the Nile is Egypt.

95% live along its banks.

Egyptians made reed boats with push sails, not used in the Med. Egypt was the Nile and the Nile was Egypt. The Nile flowed north, the winds blew south; so, drift north, sail south, some of reed, push sails. Easy. All the various Egyptian tribes had many goddesses and gods, in total maybe c2,000. The gods ranked the highest, then the dead, then the pharaoh /god king, then priests, then the people. They traded with, *inter alia*, Minoans on Crete (who worshiped a goddess).

3700 BC Technology: The first known wheeled vehicles (with solid wheels) were used in Sumer. So, Homo sapiens, meaning wise or thinking man, didn’t think of the wheel for 200,000 years. A vehicle with wheels is part of a system, particularly roads. The gauge of modern railroads dates straight back to the earliest wheeled wagons.

Writing was the most important technological advance in knowledge

How-to-knowledge: “The important how-to knowledge that enabled civilizations to develop, like tools, fire, art, boats, buildings, plows, burial, farming, domestic animals, weapons, pottery, weaving, money, metal, and beliefs and myths, all pre-dated writing.

Writing, preserving facts / events, began with writing, the most important technological development in the history of knowledge. Different cultures far apart developed widely different symbols or pictures for different words and concepts. The first writings were likely simply to record numbers of food products trading or legal agreements.

3500 BC Pictograph writing: After cave paintings came pictographs, the first order of words. The second order of words combined pictographs, i.e., a pictograph for a mouth with a pictograph for vapor meant “words”. Then ideograms, the sign for words and the sign for vapor meant speech. The Egyptian calendar had 365 days, almost perfect. They developed a precise astronomical calendar, used even in the Middle Ages for its mathematical regularity..

3500 BC How-to knowledge / technology: The greatest invention in farming was the plow; The earliest surviving evidence of plowing was around 3800–3500 BC, in the current Czech Republic. The plow was first

The Plow just a piece of forked wood that loosened the soil for planting. It increased yields, so supported more people and a larger class of non-farmers (priests, artisans) who advanced civilization.

The plow alone did not do the job, it was part of a system, it needed a draft animal. Don't think *plow*, think *plow system*. The design of the plow improved over the centuries. Peoples in some remote areas, isolated and/or with climates unsuited to farming, or with no animals suitable to pull plows, never developed farming, thus limiting their population and development. They had cultures but not civilizations.

Every community / culture believed that it was at the center of the world and all other peoples inferior. Such attitude is named ethnocentrism, not *racism*, which developed when races began to interact.

Numbers: Sumerians (ref. 5000 BC) invented the first numeral system (base 60), and a system of weights and measures. It was passed down to Babylon mathematics: Base 60 number system:

60 is divisible by 2, 3, 4, 5, 6, 10, 12, 15, and 30. Mesopotamians learned to solve quadratic equations (highest power is 2). Math thinking was the first modern thinking. The practice of measuring angles in degrees, minutes, and seconds came from the Babylonian.

3200 BC Writing: Egypt, First known symbols-for-words, hieroglyphics. (Alphabets are symbols-for-sounds.) and earliest known decimal system. It allows indefinite counting by way of introducing new symbols.

As the priests explained, Egyptians knew that the Sun sailed over Egypt in a boat, and that the pig Set ate the moon every month, and numerous other myths / beliefs. Ptah became the principal god.

Egypt was a static society. No cultural change in 3000 years Egyptians barely changed over 3,000 years. They had no concept of progress, i.e., a sense of improvement over the years and centuries. Egyptians knew that the Lower Egyptian god Ptah created the world. Their 365 day calendar had 12 months of 30 days (tied to the moon's 29.5 day phase, 12 full moons each year), with five days added at the end. The year started when the Nile flooded its banks in the Spring and farmers planted. The word "Season" comes from "serere," Latin "to sow." It was also the first sighting of the star Sirius. Egyptians used sundials and split the day into two equal parts.

Math was add, subtract, multiply, divide: Egyptians had symbols for 1, 10, 100, etc, i.e., a base 10 numbering system. They developed the earliest known decimal system. It allows indefinite counting by way of introducing new symbols. They had precision surveying. Thousands of slaves worked for years building pyramids to help a pharaoh live in the afterlife. Egyptians dug canals to irrigate and to tame the Nile. The yearly Spring flooding made the soil fertile. Egyptians traded with Phoenicians. Around 98% were illiterate..

They used skins, grew grains, irrigated, fertilized, built shelters, used fire, baked bread, mined and smelted ores, wove wool and flax, used a forked wood for plow, had laws, a numbering system.

Egyptians used medicine, but believed there was a divine (god-like) origin of diseases. So doctors sought divine guidance. The Cretean / Minoan civilization paralleled Egypt's.

In China, 7,000 terra-cotta warriors were constructed to protect the Qin emperor in the afterlife.

3000 BC Sumerian civilization Civilization: Sumerians had numerous gods and a main god named Marduk. Sumerians in cities developed metal working, irrigation, a four wheeled cart, sundials, and, most importantly, developed a written language (not just numbers) of wedge-shaped symbols, cuneiform, using a triangular

Cuneiform writing stylus on soft clay tablets (Sumerians didn't have papyrus.) with c. 2,000 characters, first as representing syllables, which, combined with other syllables, denoted words. Cuneiform is not a language, just a writing system, used by many languages, Akkadians, Hittites, and Old Persian.

Cuneiform is not a language, just a writing system Sumerians used clay tokens to record numbers of animals and grain. Men passed their social position to their sons. Sacrifice of animals (and/or humans) was the center of many ancient religions' rites. They had many gods in different temples, Sun gods, bull gods (male fertility), hawk gods, mother or Earth goddesses, water god, goddess of birth, cow deities. People prayed to gods, who were not necessarily benevolent. (Sumerian cuneiform was deciphered in 1858. Most cuneiform tablets are not yet translated.)

Bronze Age (when tin was found) The Neolithic Stone Age evolved into the Bronze Age as humans learned to smelt and combine two soft metals, tin and copper, to create a hard metal, bronze. Use of bronze first developed in the Mid-East, Egypt, Crete, and Anatolia. 15% tin makes the hardest bronze.

Discovery of bronze may have occurred in more than one locale. (Bronze only spread to China around 1000 years after it developed in the Mid-East.) Egyptians used nails. Sumerians perfected metallurgy for weapons. When the tin mines in the Eastern Med depleted, Phoenicians ventured past Gibraltar and found tin in Cornwall, SW England. Most of Europe remained hunter /gatherers.

Astronomers were the first The Mediterranean Sea: The Western world was the civilizations around the Med. Simple oil lamps were used. Astronomical observations were important to know when to plant.

to see order
in nature's
regularity

Astronomers were the first *scientists* to see order in nature. Importantly, Babylonians saw five bright objects in the night sky that moved around faster than all the other points of light in the heavens so called them "wanderers" (planets), and named them. Egyptians and Sumerians put brighter stars into constellations and assigned seasonal appearances to them.

Babylonian
Calendar

What we
know of pre-
Socratic
knowledge

Sumerians were the first to use a place-value numeral system. There is anecdotal evidence that the Sumerians may have used a type of slide rule in astronomical calculations. They were the first to calculate the area of a triangle and the volume of a cube (long before the Greeks). Babylonians developed an accurate calendar based on their observations. They thought that the Earth was a sphere. They divided the day into 24 hours, used a 60-base, place-value numbering system without a zero, and a 360 degree circle. Their lunar months had seven day periods for the five planets, plus the Moon and Sun.

Phoenicians (Canaanite Semites) occupied present Lebanon and Northern Israel and became seafarers. Akkadians, Semites from Syria, conquered Sumer & adapted their sign/symbol-for-a-sound writing to their own speech. This developed through the Phoenicians around 1500 BC into all modern Western alphabets.

3000-1200 BC Megalith rings were built in Britain, Ireland, and Normandy, oriented to the solstices. Stonehenge in Wales likely was built c2700-1200 BC, most stones from 280K away, altar stone, sandstone, from Scotland.

2700 BC Botany / Biology: Sumerians knew of hundreds of animals and 250 plants. Sumerians and Egyptians depicted humans in art.

China Civilization, China: Its civilizations evolved, used wheeled vehicles and the loom. Chinese emperors claimed their status came from heaven. Chinese developed pictograph writing and began to make silk, wrote on it. The secret of silk was not known in the West for 3,000 years. Dragons symbolized power, happiness, immortality, procreation, fertility, activity, warding off evil spirits, and knowledge. Dragons pervaded Chinese art and mythology. Chinese astronomers recorded a comet in 2296 BC.

A heaven
for the
righteous
and a hell
for bad
people is a
masterpiece
of social
control

Civilization, Egypt: Sepulchral iconography appeared on the first great pyramid, the step pyramid, the tomb of king **Zoser/ Djozer**, built c2630-c2611. Egyptians had no word for religion as their belief system was universal. Egyptians lived to die, spent their lives and fortunes preparing for death and the eternal afterlife. The concepts of a glorious afterlife for good people and eternal pain for disobedient people is a masterpiece of social control. But one's social position in the Egyptian afterlife was the same as before death. Egyptians did not dispute the priests's teachings that gods controlled all natural events. Building pyramids needed an extensive governing organization. Egyptians used three writing systems, pictorial hieroglyphics, a simplified version called hieratic, and its derivative, demotic.

2630 BC Pyramids: The Egyptian pyramids were built c2630-c1830 BC. The biggest, of **Cheops / Khu-fu**, was built c2589-c2566 BC, using c2.3 million limestone blocks from the Giza plateau, each c2.3-15 tons, & 100,000 workers. Its base, covered 13 acres, almost a perfect square, was oriented east-west. Without metal, Egyptians used obsidian to cut the stone blocks. Levers, log rollers, & ramps were used to move the stones.

Scientia:
Latin for
knowledge

2600 BC How-to knowledge / technology preceded science. Egyptians built boats with wooden planks from Lebanon, letting them sail with square push sails or row the Med, rougher than the Nile.

Triangular *lateen* sails, allowing sailing into the wind, were not fully developed until the 15th century in Portugal. Horses and camels were used in Central Asia.

Camels had big feet, used little water, enabled caravans to cross the vast deserts. Egyptians began to use oxen to pull plows. Human communities were dispersed with vast distances between them. The wheel reached the Indus Valley and most of North Europe 1,000 years after it was used in Sumer.

2500-1500BC Rise and fall of the Indus River Valley Civilization (Pakistan) (discovered in 1929). Its major cities were Mahuang-Dark and Harappa, gone now. It was the third large Western river valley civilization, larger than Mesopotamia or Egypt. Nomadic Aryan horsemen destroyed it c1500 BC. Its cities had complex town planning and engineering knowledge. It had toilets in private houses, public baths, a drainage system, paved streets, a written language (not yet deciphered). There were no known tombs or temples. Oven-burnt brick was used to line irrigation canals. Only its caste system survived.

Indus River
Valley
Civilization

2400 BC Political Theory / religion: In Egypt, a god-king / pharaoh, son of the Sun-god *Ra*, creator of the universe, judge of humans, ruled. *The Pyramid Texts* indicate that the pharaoh ruled according to principles, the main one being Ma'at, truth and justice, order, and cohesion.

This was the first known evidence of the association of a deity with morality, a useful concept for a king. The opposite of *ma'at* was Isfet, the principle of chaos, disorder, decay.

Osiris and Mid-East myths. Resurrection myths before Jesus.	<u>Egyptian myths before "history": The Pyramid Texts</u>, carved on walls inside pyramids (discovered 1881), told of <i>Osiris</i>, who reputedly had brought civilization to Egypt, being cut into pieces by his brother, then put together by his wife and resurrected. <u>Osiris was the most notable resurrection myth before Jesus.</u> <u>Osiris myths became popular throughout the Mid-East.</u> Many ancient Mid-East religions also focused on a resurrection, including <i>Tammuz</i> in Mesopotamia, <i>Attis</i> and <i>Adonis</i> in Syria, <i>Mithra</i> in Persia (Iran), the <i>Eleusian Mysteries</i>, the <i>Orphic Mysteries</i>, and <i>Dionysus</i>, Greek god of wine, fertility, and drama, who was resurrected by his father <i>Zeus</i>, and finally Jesus's resurrection as Christianity's central tenet. All these religions <u>taught that Man could have everlasting life after death.</u>
Pyramid Texts 2400 BC	<u>The Pyramid Texts</u> also described the embalming procedure used on <i>Osiris</i> (remove organs, dry the body, wrap it); thereafter used by all who could afford it. On death, one knew that <i>Osiris</i>, who resided in the afterlife, would judge whether one had lived a virtuous life, that one had not done various specific bad acts to gain eternal life in the afterlife, i.e., a continuation of life. Fail the test and get eaten by a combination crocodile/ lion/hippo. <i>Osiris</i> granted "salvation" from that fate. Religion was thus a religion about death. Writing after the <i>Pyramid texts</i> came the <i>Coffin texts</i> and the <i>Egyptian Book of the Dead</i>.
2200 BC Technology	<u>Egyptian technology:</u> They developed <u>weight standards with a balance scale</u> and developed the arch (but rarely used it). The arch takes nature apart and reshapes it, an intellectual triumph. Egyptians were the first to make leavened bread from fermented grain. Sumerians and Egyptians developed wheeled war chariots. They revolutionized warfare. Most were illiterate, so rules of behavior were primitive, controlled by the priests.
2100 BC c.2000 BC Gilgamesh	<u>Ur-Nammu</u>, Sumer king, wrote the first complete law code, with specific money fines for specific crimes. <u>Sumerians had epic poems.</u> The best known is <u><i>Gilgamesh</i></u>, (king of Uruk) and 2/3 a god. The poem, like other "religions" of the day, portrayed gods with all the emotions of ordinary humans, joy, envy, sorrow, courage, fear. It was inscribed on 12 clay tablets likely c.1600 BC. (See 1600 BC) The poem told the story of Gilgamesh's journey to the underworld to discover the secret of eternal life, i.e., to avoid death. It is the first known writing to focus on an individual's mortality. Gilgamesh protested against the injustice of the Sumerian gods not giving Man eternal life. It's a logical question to a God or gods. If they have certain powers, why not use such powers?
Gilgamesh contained a flood story Many Hebrew Bible stories came from other tribes Gilgamesh was lost to history until the 1880s	<u>The epic of <i>Gilgamesh</i> included a flood story.</u> This sub-story relates that <u>Utnapishtim</u>, legendary king of the ancient city of Shuruppak in Sumer, told Gilgamesh that the gods decided to send a great flood. To save <i>Utnapishtim</i>, the god <i>Enki</i> told him to build an ark and gave him precise dimensions. He built it. His family went aboard with "all the animals of the field". A storm then caused the flood. It lasted six days. The water receded and the boat lodged on a mountain. <i>Utnapishtim</i> released a dove, a swallow, and a raven. When the raven failed to return, he opened the ark and freed the animals. <u>Utnapishtim offered a burnt sacrifice to the gods, who smelled its sweet savor.</u> In those days, flood myths were common across many cultures, extending back into Bronze Age and Neolithic prehistory. These accounts depict a flood, sometimes global, usually to destroy a people as an act of a god's retribution.
Human sacrifice	<u>The epic of <i>Gilgamesh</i> was of course known in the Mid-East at the time but then lost to history.</u> Clay tablets recounting the <i>epic of Gilgamesh</i> were found in the 1850s and 1860s in the library of King Ashurbanipal (669-627 BC) at Nineveh and were given to the the British Museum. In 1870 George Smith, an Assyriologist found the flood story in the museum. He did not then know it was part of the <i>Epic of Gilgamesh</i> but noticed its similarity to the <i>Genesis</i> flood story, So he translated it and published it in 1875. (See 1875) It caused a stir. Scholars have also noted similarities between <i>Gilgamesh</i> and the <i>Illiad</i> and the <i>Odyssey</i> (See also 1300 BC and 1849)
2000 BC Human sacrifice	<i>Genesis</i> 22 says that Jews stopped human sacrifice c. 2000 BC when Yahweh told Abraham, the nominal founder of Judaism, not to kill his son Isaac after first ordering him to do so. Christians, Buddhists, and Muslims never practiced human sacrifice. Aztecs, Mayans, and Incas did so, Aztecs on a large scale. The <i>Hebrew Bible</i> says that Abraham led Jews, then a small tribe with a new idea of creation, from Ur in Mesopotamia to Canaan (Israel/ Lebanon). God's covenant with Abraham was that his descendants would inherit Canaan. Semitism was the most lasting & most influential religion of ancient Mid-East cultures.
Social Classes	<u>Life in the Mid-East:</u> The major social classes in the earliest civilizations were 1. Priests. 2. Kings/princes and their courts, who joined with priests to govern the lower classes. 3. Peasants / slaves / serfs. (Artisans developed from the slave class). 4. Merchants, at first, shipowners. Separate minor classes were small retailers, gang workers, seamen, herdsman, and mercenaries.

1775 BC Mesopotamians worshiped many gods and goddesses, who presumably controlled specific aspects of life. They used sundials and discovered what's now known as the *Pythagorean Theorem*.
The spoked wheel was used in Mesopotamia, but did not reach Europe for c1,000 years.
Mesopotamians used a curved bronze sickle, similar to ones used today in undeveloped cultures.
Early Mesopotamians thought the world was a disk floating in the ocean under a sky-dome.

Hinduism Hinduism is the Western name for the many different philosophic and religious sects / traditions of Hindostan /Hindustan (Land of the Hindus) / India. Despite the many sects, Hindus had certain shared concepts, rituals, sacred texts, sacred sites, but without the Western concept of a monotheistic God. Hindustan was a land of 150 languages where hundreds of millions spent their lives in poverty growing food and tending animals. How or when each Hindu sect began is uncertain. They are the oldest known philosophic and religious traditions, most without gods, but some with thousands of gods like the Egyptians.

Rig-Veda, Sama-Veda, Yajoe-Veda, Atharva-Veda, Aranyakas The six major Hindu scriptures are the *Rig-Veda*, *Sama-Veda*, *Yajor-Veda*, *Atharva-Veda*, *Aranyakas*, (compiled 2,000-1,200 BC), and the *Upanishads* (written between 900-600 BC). One of its roots was the ancient Vedic religion. Brahmins introduced the concept of *reincarnation*, where people who die come back to live in a different form, dependent on how they lived their life. Basically how obedient they were to their Brahmin masters. One's position in life, one's caste, is a result of all one's parents.

The Caste system is a very effective means of social control The Caste system, like the Egyptian and Christian concepts of a heaven and a hell is an effective concept for social control, and thus, of course, is promoted and supported by the ruling Brahmin class.

The Vedas are the earliest known Hindustan literature. They painted a circular picture of the universe. A universal spirit pervades all things. Different Hindu sects have different dogmas.

The Supreme Court of India has ruled that Hinduism is not a religion but just a way of life. Hinduism has no one philosophic concept, so it is not a religion in Western terms. Various Hindu sects are vegetarian, some practiced human sacrifice, some sects are pantheists, monotheists, and some are atheistic. The *Rig Veda* is silent as to the how the universe and the gods began.

1775 BC **Atheism defined, It has many variants.** Morals: Most generally, Atheism is merely the absence of a belief in any supernatural entity. It does not infer any positive beliefs, such as a moral code, which generally develops as societies evolve. Many current evils (slavery, killing sassy children) were once Biblical virtues (**Will Durant**).

Critical atheism contends that belief in a God that implies a contradiction (such as the Christian or Muslim God) is an irrational concept. *Soft atheism* asserts that there's no credible evidence of a god or God. *Hard atheism* simply says there is no god, supernatural force or entity. In ancient times, most people believed in gods of some sort. Scholars identify at least a dozen different variations of atheists. **Richard Dawkins**, a well known current atheist, states, "The absence of any evidence that a god *does* exist makes a god so unlikely that one can assert with *scientific* certainty but not *absolute* certainty that a god does not exist."

Thousands of belief systems. Believers in gods/God: There are thousands of belief systems, dead and alive, based on purported supernatural entities, some are based on human reason alone. (See 1890-*the Golden Bough*.) Some have millions of believers, Many are personal belief systems, possibly a personal variation of a more popular belief system. Ideologies also vary. Beliefs in an afterlife are as varied as creation myths.

Hindu Caste System: What Hindus know Different Hindu sects have different beliefs, sometimes contradictory. But it has some common concepts, rituals, cosmology, scriptures, and pilgrimages to sacred sites. Hindu texts are classified into Ruti ("heard") and Smti ("remembered"). Common to the hundreds of Hindu sects are two concepts the caste system and reincarnation. The Caste System teaches that if your father is a dung collector, you are a dung collector all your life, period. Your caste determines your job, where you live, and your diet. You may not marry outside your caste. The Caste System is a terrible and cruel but effective system of social control. **Nehru** and **Gandhi** rejected it.

1775 BC The Hindu scripture *Manusmriti* states that the castes were created by God. Even the lowest castes, without education, those persons it treats most cruelly, do not question it.

Hinduism thus, like other cultures, enshrines inequality as part of a unchangeable cosmic scheme. The ruling Brahmin caste promotes and supports it as it helps prolong their ruling position.

Another important Hindu concept is *karma*, i.e., how one acts affects the individual and the life he lives, and that the intentions of individuals affects them and the life they live. Right and wrong actions increase the positive and negative potential energy / *apurva* of each person. *Apurva* is eventually released (in this or the next life) and causes good or evil to the person. So,

misfortune is caused by one's prior life's bad deeds. Wisdom is the realization that everything is suffering. It too is effective in controlling the lower classes

Brahmans Hindus have three kinds of priests, Brahmans, gurus, and yogis. The religious activities of Hindus are devoted to ritual observances that permit every aspect of life to come into tune with various gods.
Yogas Like other god systems, religious Hindu sects ascribe different powers to different gods.,
Gurus

The four goals of human life in classical Hindu thought were *dharma* (duty, righteousness, ethikos), *artha* (livelihood, wealth), *kama* (sensual pleasure/ fulfillment), and *moksa* / *moksha* (liberation, freedom from *samsara*). Hindus believe that when one dies, he is reincarnated, as a human or animal (or a bug).

Hindu Trinity, the Trimurti The Hindu divine trinity is Brahma, the creator of the universe, Vishnu, the preserver of the universe, and Shiva, the destroyer. Shiva had sex with Madhura, a worshiper. So Shiva's wife turned Madhura into a frog. After 12 years living in a well, Madhura emerged and gave birth to Indrajit. Accepting the Veda (including the 112 *Upanishads*, written c. 700 BC) as the most sacred scriptures is Hinduism's other common idea.
Westerners often think these beliefs do not make sense. Some Hindus think that Western religions' beliefs do not make sense. The central theme of the Upanishads is the identity of the human and divine or cosmic. The *Rig-Veda*, is verses of wisdom, the *Sama-Veda*, and the *Yajur-Veda* are hymn books.

The Atharva-Veda is a book of magic spells. Artifacts relating to an early Shiva have been found in Mohenjo-Daro and Harappa, the major known cities of the defunct Indus Valley civilization.

1775 BC Four main castes Hinduism's four main castes are:
1. Brahmins - the priests, light skin, those with light skin were thought to possess goodness.
2. Kshatriyas - rulers and warriors, red skin, those with red skin possess passion.
3. Viasyas - commoners/merchants, professionals, yellow skin, have both passion and goodness.
4. Sudras - artisans/laborers, black skin, attributed with darkness.

Plus the Untouchables / Dalits - in no caste -beggars -menial jobs- they live in the streets.

As we see, the higher castes were the lighter skinned. In the West, as different cultures developed, ethnic differences became theories of ethnic supremacy, with lighter skinned peoples dominating darker skinned peoples. In most Hindu sects, women have few rights.

For millennia, widows were expected to immolate themselves. Sanskrit was then a rich complex language predating Hebrew, and has a common root with Greek and Latin.

Hammurabi Code, to prevent the strong from oppressing the weak Law, Babylon: **Hammurabi** (1792-1750 BC), founder and warrior king of the first (Old) Babylon dynasty, issued the first Western code of laws, "to insure that the strong not oppress the weak." The tendency of the strong to oppress the weak was and is as pervasive a characteristic of Man as the sexual instinct. A corresponding instinct was and is a sense of fairness and justice.
As noted, the earliest "rulers" were those who had a perceived connection with supernatural entities with great power, i.e., priests. As civil rulers developed apart from the priests, one panel on the obelisk with the **Hammurabi code** shows **Hammurabi** getting the laws from Shamash the Mesopotamian Sun god of justice, morality, and truth.

"Eye for eye." **Hammurabi's** code reflected his times. "Hit your father, lose your hand. Help a slave escape, die. Put out a nobleman's eye, lose an eye. Put out a slave's eye or break his bone, pay one mina. To divorce, return the dowry Poor men could sell themselves or their children to their creditors as slaves. The code allowed slaves to be released, to own property, and marry daughters of free men Civil rulers often claim authority from a supernatural entity or entities. (See 1532-*Force, Fraud, Favors*). Civilizations began to develop in places beyond irrigable river valleys.

Crete On Crete, the Minoan civilization (discovered by Europeans in 1900), was the most sophisticated of its time; bathrooms had running water, buildings had light and air shafts, and elaborate art, and a matriarchal religion. Minoans dominated the Med. trade from c2,000 BC to c1600 BC. How it disappeared is uncertain.

1750 BC Shang Dynasty China: Shang, the first known Chinese dynasty, united and ruled China until c1,000 BC. Their main god was Shangdi or Shang Ti. Slaves were buried with **Shang** kings to serve him in the afterlife. The Chinese ruling class, Mandarin, was a meritocracy, except for the emperor's family (hereditary). China had hundreds of local lords, roughly dominated by 12 more powerful lords. Fully developed Bronze Age culture, i.e., bronze urns, were made in China and Viet-Nam by 1600 BC, over 1,000 years after the Bronze Age in the Mid-East. China made water clocks, developed pictographs for words. The earliest known Chinese writing was pictographs on bones and tortoise shells.

China, the most populous country in the world, never developed religions like in the West..

- 1700 BC **Greece** Greece: Aryan-speaking barbarian tribes, Hellenes, first Ionians, then Aeolians, Dorians, Macedonians, and Thracians, migrated south through the Balkan Peninsula to present day Greece, a small mountainous area in a sea with many islands. They conquered the resident Aegean civilizations, adopted the skills and arts of the far more sophisticated Minoan civilization on the island of Crete (South Aegean Sea) which had, *inter alia*, pottery, and established cities. Greeks developed sailboats.
- 1600 BC Geography: A volcano destroyed the Greek Aegean island of Santorini/Thera. The resulting tsunami (or Greeks) wiped out the Minoan Civilization on Crete. Minoan Linear A writing has not been deciphered.
- 1600 BC Beauty: The concept of human beauty is a common fundamental issue in philosophical aesthetics. Beauty has traditionally been counted among the ultimate values, with goodness, truth, and justice. Ancient Egyptians regarded beauty as a sign of holiness. Male beauty was mentioned in the *Epic of Gilgamesh*. The *Hebrew Bible* records that Sarah, Rebecca, Rachel, Leah, Esther and Job's daughters were beautiful. It is a primary theme among ancient Greeks. Helen's beauty was basic to the *Odyssey*
- 1500 BC **The Hebrew Bible** The Jews were a Semitic tribe like other tribes in the Mid-East. *Books of The Hebrew Bible* were written over several centuries. It depicts its God as all powerful, all-knowing and all-good as well as vain and vindictive, even genocidal. Beliefs and stories in the Mid-East religion were known to each other. *The Hebrew Bible* has three parts. Some parts were put in writing centuries after the reputed events they describe. The earliest "scriptures" of the Jewish people were developed before they had a settled alphabet. They were oral, passed down in songs, poems, narratives. *The Law/Torah* (Teaching), also known as *The Pentateuch* (first five books, *Genesis, Exodus, Leviticus, Numbers, and Deuteronomy*), were probably composed around 1500-1400 BC. These five books have 365 commands not to do this or that. A second group were written around 1100-900 BC. Other books were written probably around 750-450 BC. "Books" of the time tended to be short, like a modern chapter.
- 1500-1400 BC **The Torah** The Torah has orders for every aspect of life. The *Genesis* creation story is likely from *Enuma elish*, the Babylonian creation myth and is similar to a story in King **Ashurbanipal's** (669-627 BC) library at Nineveh and similar to other myths of the Chaldeans, Phoenicians, and Assyrians. The story of baby **Moses** in a basket floating in the river is quite similar to an earlier myth about **Sargon** (c. 2637-2581 B C), a king who united Sumeria.
- c1500-1400 BC **Genesis Hebrew Bible** The stories of the fall of Man (Adam) and the flood likely derive from the Sumerian *Adapa* and *Atrahasis*. Parts of the *Torah* were also quite similar to **Hammurabi's Code**, i.e., "life for life, eye for eye, tooth for tooth." "Genesis 2:4 says Yahweh was the creator of the universe and humans. *Gen. 1-27*, "And God created Man in His image, in the image of God. Male and female created He them." Yahweh was transcendent [something apart from normal or physical experience]. He created Nature but was not in it. For Jews, the Moon and Sun were not gods but Yahweh's creations, God is eternal, the source of morality, and Jerusalem was the center of the Earth. *Genesis* said that God created the Earth in six days and also in an instant; and that He made the Sun three days after he made light.
- Adam and Eve. Genesis** Genesis has two different creation stories. In the first, verses 1:1-27, Adam and Eve are not named. God created Man in his image and told Man to multiply and to be stewards of what God had made. In the second, 2:16-19 and 3:14. God made Adam from dust in the Garden of Eden and told him that he can eat the fruit of all the trees except the tree of knowledge of good and evil. 2:17. The Lord then created Eve to be Adam's companion and a serpent fooled Eve into eating from the forbidden tree, and Eve gave the fruit to Adam. This let them know good and evil. The Lord was so angry with this disobedience that he banished them from Eden. For Jews and their offshoot, Christianity, this explains how death and sin came into the world. Later, God got angry again and drowned every human and land animal not on Noah's ark. 7:4, 7:21-23. God also killed everyone in Sodom and Gomorrah except Lot, 19:24-26. After banishment, Adam and Eve had children, Cain, a farmer and Abel, a shepherd. Abel offered a lamb to God, Cain offered Fruit. God preferred the lamb, so Cain jealously killed him. God asked Cain where Abel was. Cain said, "I know not. Am I my brother's keeper?" Adam lived 930 years.
- Eat the fruit from all trees except from the tree of knowledge of good and evil. God banished Adam & Eve**
- Men rule; a man could sell his daughter** The Bible says men owned women: A daughter was owned by her father who could sell her as a wife or slave, but she will not be freed after six years like males. *Exodus 21:7 Ex. 21:7*. A man could have sex with his niece or daughter. Non-virgin brides are to be stoned to death. *Deuteronomy 22:20-21*.

as a slave or wife	<u>Marriage with non-Jews was prohibited.</u> Women could not initiate a divorce. The Lord told women, “in sorrow thou shalt bring forth children, and thy desire shall be to thy husband, and he shall rule over thee” <i>Gen.3:16.</i>” and <i>the 10th Commandment.</i> See p. 483-Male Superiority
Slavery: no problem.	<u>Slavery was the rule.</u> If a slave owner beat a slave who lived for a day or two and then died, no problem, as the slave is the owner's property. <i>Exodus 21:2-6</i> and <i>20-21. Ex. 21:7-11. Lev. 25:44-46.</i> Men “may acquire male and female slaves from the pagan nations . . . around you.”
The Exodus: Moses led Jews to Canaan., when? We don't know. c.1550-1450	<u>The Ten Commandments,</u> Thou shalt not covet thy neighbor's slave. <u>The Holy Bible's clear endorsement of slavery evolved seamlessly into a moral justification of White supremacy and racism.</u> According to <i>Ex.11:4-6, 11-7, 12:12, 12:29. Lev. 25:44-46. God killed the first born of every Egyptian family. Moses</i> then led Jewish slaves from Egypt to Canaan (Israel, Lebanon). (Egypt has no records of Moses or his taking slaves out of Egypt.) Scholars differ on when Moses led Jews from Egypt to Canaan, Most estimates are 1550-1450 BC. The trip took 38 years. Before they entered Canaan, Yahweh parted the Red Sea and on Mt. Sinai gave Moses the <i>Ten Commandments. Ex.19:18-25 and 20:1-25, 31:18, Deut.</i> <i>The Ten Commandments, Ex. 20:2-17,</i> were instructions (to men) on how to live and gain favor with Yahweh. They appear to have been copied from parts of Hammurabi's Code (c.1947-05 BC). Yahweh told Moses to build an altar to sacrifice animals and to kill those Jews who had worshiped a golden calf. Moses killed 3,000. <i>Ex. 32:27-28.</i> In Canaan, they joined Hebrew tribes living there.
Leviticus c.1500-1400 BC	<u>Human Sacrifice:</u> <i>The Hebrew Bible</i> has verses where God demanded and sanctioned human sacrifice, <i>Leviticus 27:28-29.</i> God ordered Abraham to sacrifice his son Isaac, without any indication that such was unusual. <i>Gen. 22:1-10,</i> also <i>Judges 11:29-40;</i> and <i>2 Samuel 21:1-9.</i> In contrast, some Jewish biblical verses indicate that human sacrifice was against God's word.
Deformed? You're out	<u>Circumcision:</u> An uncircumcised boy must be abandoned by his parents and the community. <i>Gen.17:14.</i> <u>Deformities:</u> A man with a blemish, or lame, or blind, or had a flat nose, or was a dwarf, or broken handed, or broken footed, or had scurvy, could not approach the altar. <i>Lev. 21:17-21.</i>
Numbers	<u>Warfare:</u> “Kill all the boys & non-virgin women, but “save for yourselves every [virgin].” <i>Numbers 31:17-18</i> <u>Obedience:</u> God said, “I the Lord thy God am a jealous God (repeated often) visiting the iniquity of the fathers upon the children onto the fourth generation.” <i>Ex. 20:25, 34:7; Num.14:18.</i>
Hebrew Bible	God burned those who complained. <i>Num.11:1</i> and 250 men who offered incense. <i>Num.16:35.</i> He gave Phinehas and his sons everlasting priesthood for killing a Jew who had a foreign wife. <i>Num. 25:13.</i> <u>Abortion:</u> <i>Num. 5</i> describes a ceremony to induce an abortion.
Deuteronomy	God commanded that Jews fear him. <i>Deut. 6:2, 7:13, 24, 8:6,</i> and to <u>take the Bible literally</u> <i>Deut.13-1</i> <u>Rape:</u> If a man rapes a non-betrothed virgin, he pays her father 50 shekels and takes her as a wife. <i>Deut. 22:28-29.</i> That is, the rape victim must marry (become the property of) her rapist.
Chosen people	<u>Lending money:</u> Jews could not charge interest on a loan to other Jews (usury) <i>Deut. 23: 20.</i> <u>A child born out of wedlock:</u> couldn't enter into the Lord's congregation for ten generations. <i>Deut. 23:2</i> <u>“The Lord, thy God hath chosen thee:</u> to be a special people . . . above all the people. <i>Deut.7 3:6.</i>
Hebrew Bible	<u>Omnipotence:</u> The Lord is the everlasting God, the Creator of the ends of the earth.
Omnipotence	“See now that I, even I, am he, and there is no god beside me; I kill and I make alive; I wound and I heal.” <i>Deut.32:39.</i> “He who forms the mountains and creates the wind,..who makes the morning darkness, and treads on the heights of the earth- the Lord, the God of hosts, is his name.” <i>Amos 4:13.</i> God can remove evil tyrants (like Nebuchadnezzar) <i>Daniel 2:21.</i>
Hebrew Bible Miracles	<u>Miracles in the Hebrew Bible:</u> Miracles are divine interventions to do things <i>logically impossible.</i> They illustrate God's omnipotence. Specifically, creating the universe and animals and humans <i>Gen.1:1-2.</i> God caused a worldwide flood <i>Gen.6:17, 7:4-23.</i> Sinful cities, Sodom and Gomorrah, were destroyed <i>Gen.19:24.</i> The ten plagues of Egypt <i>Ex.7:20-12:30.</i> Water was turned to blood <i>Ex. 7:14-25.</i> God covered Egypt with frogs <i>8:20-32,</i> Hail <i>9:13-35.</i> The first born <i>11, 12:1-30.</i> All the dust of the land became lice throughout Egypt.” <i>Ex. 8:16-19.</i> The sixth plague of “boils and blains,” <i>Ex. 9:8-12.</i> The plague of locusts covered Egypt, <i>Ex.10:1-20.</i> The Burning bush was not consumed. <i>Ex. 3:3</i> Aaron's rod was changed into a serpent. <i>Ex. 7:10-12.</i> The Red sea was divided. <i>Ex. 14:21-31.</i> The bitter waters of Ma'rah were sweetened <i>Ex. 15:23-25.</i> Manna was sent to feed the Israelites, <i>Ex.16:14-35, Lev. 10:1-2.</i> God caused the Earth to open and swallow Ko'rah and his company. <i>Num.16:32-34.</i>

**The Bible
is not kind
to babies**

Babies: "Kill every male among the little ones." Num. 31:17. "Slay both man...and woman, infant and sucklings." 1 Samuel 15:3. "Dash their children and rip up their women with child." 2 Kings 8:12. Children: Anyone that curseth his father or his mother shall be surely be put to death. Lev. 20: 9.

**c.1500-1400
BC
Persons
to kill**

Persons to be killed: The Hebrew God commanded killing (including stoning to death) an huge array of persons, including: all who lived in the land promised to Moses, Hittites, Amorites, Caananites, Girgashites, Perizzutes, Hivites, Jerubsites, "Don't leave alive anything that breathes. Completely destroy them. Deut. 20 10-18. "Thou shall smite them, and utterly destroy them. Thou shall make no covenant with them, nor show mercy unto them . . . thine eye shall have no pity on them." Deut.7:3-6.)

And Blasphemers. Deut.1:1-3 and 6:15, and 32:23, Lev.24:11-16 and 23. 1 Samuel 15:3, Ezekiel 9:4-7, Hosea 13:16, Isaiah 13:9, 15-18. And, Persons who won't surrender. Deut.20:10-14, Lev.5:44. And, All inhabitants of a town if some of the inhabitants worship another God. Deut 13:13-19.

And Men who have sex with a betrothed woman (and the woman also, if it occurs in the city and if she does not cry out for help) Deut. 22:22-26. And False prophets. Deut.18:20 and Zechariah 13:3. And Those who hit, curse, or disobey a parent, Ex. 21:15 and 17 and Lev.20:9 and Deut. 21:18-21. And Persons who believe in another religion (or who worship idols, the Sun, or stars.) Deut.13:7-12, 17:2-7 and Ex.22:20. And Non-virgin brides. Deut.22:20-21. Foreigners. Deut.7:2. Heretics Ex.12:29. And Men who have sex with their father's wife. Deut.22:30, or with men, or thieves. Zech.5:3-4.

And Priests' unchaste daughters (not as the daughter sinned, but because it dishonors the father) Lev. 21:9. Those who work on the Sabbath (even gathering firewood) Ex.31:12-15 and Num.15:32-36. Adulterers Lev. 20:10-12 and Deut.22:22. Fortune tellers. Lev.20:27. And. Homosexuals. Lev.20:13.

And Those who take the Lord's name in vain. Lev. 24:10-16. Witches, Ex. 22:18. A man or woman with a "familiar spirit". Lev.20:27. Men or women who have sex with animals Ex.22:19, or their mother-in-law, aunt, or daughter-in-law Lev.20:11-16. Dissidents Ex. 32:27 & Chronicles 15:12-13. Perjurers Zech. 5:4

And Religions: The Hebrew Bible commanded, justifying, killing various categories of non-believers, foreigners, and/or sinners, Natural sufferings, floods, diseases, were "Acts of God" .

**Moses spoke
to
God**

Moses was the first to proclaim that Yahweh created the world. (Yahweh means "He who causes to be"). He expressed The Argument from Religious Experience (I saw / spoke-to God, therefore God exists.) It is one of the oldest and simplest arguments for God. It relies solely on the validity of its claim. It is as probable or improbable as any of a multitude of personal testimonies. If this argument were true, then every claim of seeing / speaking-to God would describe God identically. They don't.

**1400 BC
Mono-
theism**

Jews developed the notion that one God / Yahweh had made a paradise, from which Man, Adam (Hebrew for man) and Eve (Hebrew for life) by their own fault, were expelled. Jews were the first known to insist that men, not gods, were responsible for their acts. Yahweh reputedly gave the pious a long life and the impious an early death. The Hebrew Bible has no mention of a reward or punishment after death. But, some evil people prospered and lived long lives. (In the 2nd century BC, Semitism adopted a personal afterlife judgment and resurrection belief.)

**Chinese
Writing**

Chinese writing had c25,000 pictographs. This is still used. It created a class of Mandarins who could write. They governed. One's education was mainly learning to read. Only the wealthy could afford to do so.

**c.1370 BC
monotheism**

Pharaoh Amenhotep 4 (1375-58 BC) (husband of Nefertiti) said there's only one god, Aton, the Sun god, the first monotheistic religion, At his death, the polytheistic priests of Ammon Ra discarded Aton.

**c.1300 BC
Sumerian
epic poems**

Another Sumer epic was The Epic of Creation. It praised the Sumerian principal god, Marduk. A third epic was the Ludlul Bel Nimeqi (I will Praise the Lord of Wisdom), known as The Poem of The Righteous Sufferer. Around the Mid-East at the time were scores of religions and hundreds

**Poem of the
Righteous
Sufferer**

of gods. This poem is a monologue of an innocent and pious man, Šubši-mašrā-Šakkan / Shubshi-meshre-Shakkan who is suffering. The text indicates that he occupied high office, had slaves and fields. Courtiers of the king had caused him much strife, had put a foul disease on him,

**He asks the
main god,
Marduk to
help him.**

he does not know why. He asks Marduk to help him. He has been faithful in all of his duties to the gods. He speculates that perhaps what is good to man is evil to the gods and vice versa. In the end, Marduk, sends a conjurer who delivers him from his sufferings. This theme of an innocent man suffering and asking a god for help dates to 1700 BC but the better known Babylonian

version was composed in Akkadian on 4 tablets likely around 1300 BC, why it's here in this history.

This epic was well known at the time but lost until 1950s

This *Poem of the Righteous Sufferer* was the first known iteration of what became known as *The Problem of Evil*. It is strictly a logical problem. The sufferer wonders why he, a man who respects the gods should be suffering. He asked his god Marduk to help him. Gods were then believed to cause natural events, even harmful ones, like floods or plague. This poem later became known as the *Sumerian Job* or the *Babylonian Job*. It is universally considered to be the source of the Hebrew *Book of Job*. Tablets recounting it were found in the library of the Ebabbar Temple at Sippar, 19 miles NW of Babylon in the 1950s by archeologist Sir **Henry Rawlinson**.

When the Book of Job was written is uncertain.

The Book of Job, (*Hebrew Bible*) is the best known story of a pious man suffering needlessly. When it was written is unknown. We discuss it as it is an important link in the history of the basic argument against a God that became known as the *Problem of Evil*. It says, "In the land of Uz there lived a man whose name was Job. This man was blameless and upright; he feared God and shunned evil. He had seven sons and three daughters, he owned 7,000 sheep, 3,000 camels, 500 yoke of oxen and 500 donkeys, and had many servants. He was the greatest man among all the people of the East." The Hebrew scriptures relate that the Jewish Lord let Satan kill Job's children and destroy his possessions to win a bet with Satan. *Job 1:8-22*.

Problem of Evil in the Bible

Job complained of his treatment. The Lord asked Job, "Who are you to question my ways?" *Job 42:10-15*. Job excused God, "The Lord giveth and the Lord hath taken away. Blessed be the name of the Lord." 2:21. "Shall we receive good at the hand of God, shall we not receive evil?" *Job 2:10*.

The Hebrew Bible says God will help you

Other verses of the *Hebrew Bible* describe that the Lord will help people who are suffering.

"God is our refuge and strength, an ever-present help in trouble. *Psalms 46:1*

"Unless the Lord had been my help, my soul had almost dwelt in silence." *Psalms 94:17*,

"I am thy God. I will strengthen thee." *Isaiah 41:10*,

c. 1300 BC

"Because thou [God] had been my help, therefore in the shadow of thy wings I will rejoice." *Psalms 63:7*.

"Cast your cares on the Lord and He will sustain you." *Psalms 55:22* .

"The righteous cry out, and the Lord hears them. He delivereth them out of all their troubles." *Psalms 34:17*

Pious persons suffering

The problem of pious people suffering needlessly and expecting their God to help them appears in other verses in the *Hebrew Bible*: *Habakkuk 1: 2-4*, "O Lord, how long shall I cry, and thou wilt not hear! Even we cry out unto thee of violence, and thou wilt not save. Why dost thou show me iniquity, wherefore lookest thou upon them that deal treacherously, *Psalms 10*: "Why standest thou afar off? Lord, why hidest thou thyself in times of trouble?" *Psalms 83:1-2*, "O God, keep not thy silence . . Thine enemies make a tumult."

Innocents suffering needlessly was the fatal problem for the God of the Hebrew Bible.

If the Hebrew *Biblical* God existed not just in words but in deeds, He would act all-powerfully and benevolently and would prevent needless suffering of innocents. But we know that innocent believers did and do suffer needlessly. No God prevents their suffering.

This contradiction between the claimed omnipotent benevolent, all-knowing God of the *Bible* and the suffering of humans is the basic problem of the *Problem of Evil*. The *Problem* was a Sumerian problem 1300 years before Christ. It was a Jewish problem when the *Book of Job* was written.) This contradiction was well known to Greek philosophers, particularly Stoics.

See **Irenaeus** at AD 186 when the *Problem of Evil* became a Christian problem.

Bible responses to needless suffering.

The Hebrew Bible's answers to needless suffering *Genesis's 3:17-19* (and *Romans 5:123*), paraphrasing, said that, "You Adam shall suffer because you disobeyed.

The Lord did not explain to Job why he suffered. He just gave Job new children and a new life.

Marduk, the Sumerian god, also did not answer *why* the righteous sufferer suffered. He just cured him.

Jewish answers to the Problem of Evil

Apart from the references to Job, Jewish literature has the principle of *sakharVa-onesh*, "reward and punishment". i. e, God rewards the good and punishes the bad.

But Jewish literature is sparse regarding the problem of innocents suffering until the Holocaust. Jews have two kinds of responses to innocents suffering. 1. The *retributivist* approach of *The Torah*, suffering is due to a specific sin. And, 2. That evil/suffering is due to something other than God, denying the existence of evil, or saying one can't understand God's ways. While the *Hebrew Bible* has Job saying God's ways are inscrutable, the *retributivist* approach is the predominant Jewish response.

1200-800 BC **Greek Dark Ages** Greek Dark Ages: Greece is largely mountainous, isolating its cities. Barbarians invaded Greece, causing the Greek Dark Ages. The Hellenes civilization stagnated, its language was not written for 300 years, cities fell, fewer and smaller communities, with little or no trade. Hellenes city-states, the polis, the master institution of Greek culture, then rose in the 9th century BC as the political, social, and economic unit.

1100 BC **Iron Age** The Iron Age followed the Bronze Age: Iron was first found in meteorites, so, very rare. Pure iron is softer than bronze, but iron from meteorites was harder than bronze (as it was a iron nickel alloy). The Mid-East didn't have nickel but they got iron from meteorites or tin from Cornwall or elsewhere, or combined in iron ore. Alloys derive their properties from their atomic structure. Almost any pure metal is weak but other metals often make it stronger. Hittites found they could produce iron by heating certain ores with charcoal.

Iron Technological advances: The use of iron from ore became widespread in Palestine and Syria. Possibly accidentally, carbon from charcoal was mixed with the iron and made steel.

The Iron Age spread slowly to Central Europe by the 8th century BC and to North Europe in the 6th century BC. Iron was used in chariots, swords, shields, cups, jewelry.

The plow was improved with an iron tipped moldboard that turned the soil over. Farming yields could be 10-100xbigger than hunting. Phoenicians began to explore the western Med, trading and sometimes settling.

c.1046 BC **China The Silk Road** China: The **Zhou** dynasty (rational philosophy) replaced the Shang (mysticism), and ruled over 800 years. The Zhou said their rule was a mandate from heaven, a usual claim of rulers. Millet, grown in the arid north regions, was the staple diet in China, Korea and Hindustan until rice replaced it c.1,000. The East (Asia) and the West (the Med) were connected by only the thinnest of threads, various trails known to caravan masters over long distances, which, collectively, only in 1870 became known in the West as the Silk Road.

Technology: Central Asian steppe horsemen, nomads, with their speed, ferocity, and agility, became a formidable military force, capable of attacking and conquering settled communities in hit, grab, and run tactics. Camels, desert animals, enabled desert nomads and traders and armies to travel farther into previously inaccessible territories in northern and central Asia. Unknown to the Med states, the Mayan Civilization began to form in the Yucatan; it lasted til around 900.

1020 BC **The Song of Solomon** Hebrew Bible: Some of the books of the *Hebrew Bible* were gentle and loving. *The Song of Solomon* speaks of love. It is unique in the *Hebrew Bible*. It has no interest in Law or Covenant or the God of Israel, or wisdom like *Proverbs* or *Ecclesiastes*. It describes sexual love between two lovers, praising each other, yearning for each other, proffering invitations to enjoy. The two are in harmony, each desiring the other and rejoicing in sexual intimacy. The women of Jerusalem form a chorus to the lovers. (Christians later said that these passages were an allegory of God's love for Israel.)

Psalm 23 **The Lord is my shepherd** Other loving verses. *Psalm 23*, "The Lord is my shepherd; I shall not want. He maketh me lie down in green pastures; He leadeth me beside the still waters. He restoreth my soul. He leadeth me in the paths of righteousness for his name's sake." And Proverbs 3-13, "Happy is the man that findeth wisdom, and the man that getteth understanding." *Ecclesiastes* is also a humane book of the *Hebrew Bible*, see 350 BC.

Civilizations: Depending one's definition of a civilization versus a culture, there have been hundreds of distinct population groups with their sets of beliefs who have flourished and disappeared from Earth.

10th-9th Century BC Chaldea was a country that existed between the late 10th or early 9th and mid-6th centuries BC, after which it was absorbed into Babylonia. It was located in the far SE corner of Mesopotamia.

Chaldean flood story is also similar to Noah's ark flood story. Like the Sumerian *poem of Gilgamesh*, Chaldeans also had a story of a great flood. It describes the building of a great ship to escape a flood, the careful caulking of its seams, the saving of the life of a humans beloved of Heaven, his selecting and taking with him onto the ship animals of all sorts in couples, the impressive final closing of the door, the sending forth of different birds as the flood abates, the offering of sacrifices when the flood had subsided, and the joy of the Divine Being who had caused the flood when He smelled the burnt offering. Noah's flood story in Genesis a few centuries later was very similar.

Greece First Philosophers-Thales-Pythagoras-Anaximander-Anaxamenes

9th to 5th
Century BC
**Greeks
traded
around
the Med**

**Greeks
started the
modern
world and
philosophy
going.**

Overview: Bertrand Russell described the Greeks: “The distinctive Western character begins with the Greeks, who invented the habit of deductive reasoning and the science of geometry.”

The Greek economy was based on trade. Beginning during the Greek Dark Ages, many Greeks sailed / rowed to Aegean islands and other parts of the Eastern Med. They colonized Sicily and Anatolia (West Turkey, including Miletus, the wealthiest Greek settlement in the East).

They established over 100 trading ports in the Black Sea, in Italy, Sicily, Anatolia, Libya, and S. France (Marseilles), including Byzantium (Constantinople) and Carthage (Tunis). Some Greek trading ports grew larger than Athens. They traded grain, salt, copper, millstones, and gum.

A feeling of national consciousness developed among Greeks based on their common language. Navigation on the Med. was crude. When ships did not know where they were, they loosed a pigeon and sailed toward where the pigeon flew, knowing it would fly to the closest land.”.

Iliad Greek epics, The Iliad (the wrath of Achilles against King Agamemnon) and the *Odyssey* were the main epics of Greek mythology. They helped standardize the Greek language. The heroes acted rationally, making an important change from a world of magic and miracles to one of reason.

Achilles fought with courage, pride, and excellence *The Iliad* is the first great romance of high adventure, of deeds of chivalry and wild fighting, of brave men, and noble women.

Odyssey The Odyssey is an epic of Odysseus, the king of Ithaca's ten year personal journey home after the Trojan War. It is the first great novel of adventure in strange parts, of miscreants thwarted.

It deals with magical and fantastical phenomena throughout. He wins and returns to his wife. These epics told of Greek gods with human characteristics. *Odysseus* in trouble invoked no gods. Zeus, the “father of gods and men” was the most powerful god. All human emotions were portrayed. In the epics, a single fundamental order structured both the natural world and human society.

**Homer's
epics were
composed
before
writing**

Both epics were attributed to a reputedly non-literate and blind poet, **Homer** of Ionia. They contained many short stories. For centuries they were spoken, performed by generations of anonymous wandering bards with no fixed text, and gradually became epics.

When the Greeks developed their alphabet from the Phoenicians c.850 BC.

When put to writing, they were probably written century apart as they had different writing styles. For hundreds of years until **Socrates and Plato**, they were the basis of Greek religion, morals, the chief source of history, and even of practical information on geography, metallurgy, navigation, and shipbuilding. **Homer** thus was one person and the personification of the entire Greek memory.

c.850 BC
**An alphabet
is symbols
for sounds**

The Med civilizations had widely differing alphabets (one symbol for one sound). One such alphabet of 20 consonants, the Phoenician (derived from the Sumerian), reached Syria, Arabia, Cyprus, Malta, Sardinia, and Greece. It was the basis of all modern European alphabets.

Some time around 850 BC, the Greeks added seven symbols for vowel sounds to the Phoenician alphabet and used it to record their speech.

Some written languages are not alphabetical, i.e., Chinese pictographs, ancient Egyptian hieroglyphics, ancient Sumerian cuneiform, and ancient Hebrew (No vowels in Hebrew).

Traders Greeks also began to mint and use coins. Greeks, with their new alphabet of 14 consonants and seven vowels, wrote on papyrus from Egypt. Greek treatises (hand copied) on technical subjects were circulated throughout the Med. by Greek traders.

Semitic Phoenicians from Tyre (rich from its dye industry) and Sidon (Lebanon), were principally seafarers / traders in the Med. The Greeks emerged into recorded history with a highly developed civilization, portrayed in their two epics. They started the modern world going.

814 BC Phoenicians founded Carthage (Tunisia), and dominated points west on the Med, and Cadiz (west of Gibraltar on the Atlantic), sailed possibly to England, settled Eastern Spain. Carthage reached one million people, made woven goods, became the greatest sea power, came to dominate the Med & rivaled Rome.

753 BC Rome	<u>Rome</u> : In myth, Romulus killed Remus (both sons of Mars) and founded Rome. In fact, barbarians, speaking a primitive variant of Latin lived there. Etruscians (Tuscany) conquered and ruled Rome.
750BC Greek gods	<u>Greek Religion</u> : Paganism was in full flower; gods and goddesses, Zeus, Athena, Hera, Poseidon, Apollo, Artemis, Aphrodite and 41 more, each with specific powers over different aspects of life or nature. Certain beliefs / myths were shared by most people, but paganism had no one overriding dogma. <u>Greece had 16 principal gods and goddesses, and 21 primordial gods and goddesses, immortal glorified humans, with human emotions</u> , i.e. lust, pride, envy, etc. coupled with remarkable tolerance and scepticism in religious matters (contrary to the rigid priest-dominated society in Egypt). Gods were aristocrats, didn't work.
The 12 main gods lived on Mt. Olympus	<u>Greeks built temples to their gods</u> . Greek priests tended temples to the various gods, conducted rituals, such as sacrifices to their god. Different gods and goddesses were identified with different cities, like Athena for Athens. <u>The 12 main gods lived on Mt. Olympus</u> , Greece's highest mountain, & paid little attention to the Greek people. Differing beliefs and speculation about social institutions were allowed. <u>Prometheus</u> , son of Poseidon, saved Man from misery by bringing down the celestial gift of fire from the Sun. Nemesis was goddess of retribution. <i>Know thyself</i> and <i>Nothing too much</i> were inscribed on Apollo's temple at Delphi. Greeks and later Romans were expected to publicly worship the gods.
Evolution	669 BC Ashurbanipal , last king of the Neo-Assyrian Empire, reigned from 669- 632 BC, like his ancestors had all books/tablets in Nineveh (on the Tigris in Iraq), copied on clay tablets for his library. (Most of the tablets are now in the British Museum, see 1875). Assyrian inscriptions recorded the Chaldeo-Babylon idea of an evolution of the universe out of the <u>primeval flood</u> and animal creation out of the earth and sea. This idea passed to the Chaldean neighbors, Hebrews, who already had their two God creation accounts in <i>Genesis</i> . The idea became strong among Greeks, particularly Anaximander (c586 BC) and Anaximenes , and then Romans like Lucretius . The Hebrews adapted many Chaldean writings into their sacred texts.
620 BC	<u>Greek cities had some democratic features</u> , but <i>only</i> for city-born free <i>males</i> . (Most Greek cities limited citizenship to property owners.) Draco , the Archon of Athens, codified the existing harsh oral laws (death for minor offenses), hence "draconian." Etruscians (Tuscany) first showed practical arches to the Greeks.
620 BC World religions founded	Between 750-350 BC, most of the world's largest faiths developed, Confucius / Kung fu-tsze /Grand Master K'ung (551-479 BC) and other Chinese philosophies. 2.The <i>Upanishads</i> and Gautama Buddha (c. 528 BC) ethical dualism, Iran. 3.Jainism (self-denial) 4. Zarathustra/Zoroaster (628-551 BC)contra the Hindu caste system. 5. Lao-tsze in China. 6. Hindus also had the materialistic Lokayata/Carvaka, c600 BC.
Reason in Greece and Hindustan	<u>Background: Reason</u> , the most important advance in the history of knowledge developed in Greece and Hindustan / India (with its rich Sanskrit). A few Greeks began to think rationally. They asked "how" do things happen, etc. instead of asking "why," which would be asking for the reason or purpose.
Thales	<u>Rational thinking originated in Greece with the Ionian philosophers</u> . Greece was not a country in the modern sense, but a geographical area with independent city-states with differing kinds of governments but with a common language and gods, paganism. Thales and his two students, Anaximander and Anaximenes from Miletus (a Greek port city in Anatolia, Western Turkey on the Aegean), and Pythagoras of nearby island Samos, are the first well known natural philosophers (scientists).
620 BC Why Greece?	<u>All religions believe that their beliefs are true</u> . (By definition, everyone believes that <i>his/her</i> beliefs are true.) Greeks, as seafarers, traded with many cultures and saw that other cultures had different gods, equally venerated. The Greek gods had human traits. Some Greek gods were evil. Oracles spoke in parables. Little was certain. Greek priests and priestesses, attendants to a god, had no one dogma to enforce to constrict anyone's thinking. Erwin Schrödinger , an Austrian physicist: Thales's scientific thinking was eased by the fact that Miletus was wealthy and not under control of a powerful state. (More Schrödinger 1927)
Scientific beliefs	<u>Scientific beliefs</u> are the currently accepted conclusions/laws of the various sciences, subject to change as the particular science advances. Most religions have their beliefs believed to come from a particular supernatural deity, are thus unchanging and unchangeable.
How scientists think.	<u>The first Greek "natural philosophers" were not philosophers in the modern sense. They were scientists</u> . Thales wanted to understand physical events and phenomena without reference to the unpredictable gods. Scientists saw that events caused other events. They saw facts.

Experiment means to measure

They experimented and found other facts. Experiment means to measure. They developed hypotheses to explain the relationships between events, they measured and connected the dots, they saw if they did something twice, it would have the same result, i.e., order in nature. They developed experiments/ procedures to verify their hypotheses. Such procedures got better and better into what millennia later was called the scientific method.

Science defined

Science in broad terms has two meanings, 1. those natural laws and principles which have been discovered & verified which govern the natural world, and 2. those methods and procedures which discover those laws. Science, as a field of study starts with facts, mathematical facts and proved observed facts, and builds them into verifiable conclusions / laws that organize and connect those facts. In short, bottom up thinking.

600 BC

Thomas Huxley (19th century), "Science is simply common sense at its best; that is, rigidly accurate in observation and merciless to fallacy in logic." **Alfred North Whitehead** (20th century), "There are no natural laws. There are only temporary habits of nature."

"The aim of science is to seek the simplest explanations of complex facts.

We are apt to err thinking that the facts are simple because simplicity is the goal of our quest. The guiding motto in the life of every scientist should be, "Seek simplicity and distrust it."

Starting with a conclusion is not philosophy but merely special pleading

Religions have beliefs about the world and about their God or gods which purportedly are true as they came from supernatural, i.e., presumptively infallible authoritative sources. They are *revealed* to man. Theology, is the study of a religion's gods or God, its attributes, and their relationship to man. Religious thinking starts with divine conclusions, assertions, revelations, and seeks arguments to support such assertions, like a legal brief or advertising copy, top down thinking. When religious beliefs appear out of sync with advances in scientific common knowledge, theologians normally seek to reconcile the beliefs with the new scientific knowledge.

Bertrand Russell (ref 40K BC) undermined virtually all purported religious theology saying, "Starting with conclusions and finding support for them is not philosophy but just special pleading."

Greek thinkers started with a new communications system, their alphabet, and papyrus, and thinking about matters and events without reference to the gods. That is, seeking natural and predictable causes. This exercise was not called "science" until the 19th century.

Thales Why Thales?

Thales (c630- c546 BC). One of the "Seven Wise Men" of Greece, was the first known natural philosopher / scientist. Before **Thales**, Greek knowledge was how-to knowledge and the Greek epics, *the Iliad* and *the Odyssey*. Greeks knew hunting, crops, and households.

Thales was well traveled; he learned land surveying and thus geometry in Egypt, and learned astronomical knowledge from Babylon (the 24 hour day, 360 degree circle, the discovery of a cycle of lunar eclipses, permitting them to be predicted). He learned that events had causes and that oracles had nothing instructive to say. In other words, Thales had facts, the first step to knowledge, the next step is understanding the facts he knew, Thales has been erroneously credited with predicting an eclipse in 585 BC. This eclipse was the first natural event for which one can assign a specific date.

Nature can be known without gods.

Pythagorean Theorem: **Thales** brought geometry to Greece. He had learned in his travels that any triangle whose hypotenuse is the diameter of a circle and whose opposite angle is anywhere on the circumference of the circle, is a right triangle. The hypotenuse of a right triangle squared is the sum of the squares of the other two sides.

Geometry became the foundation for a rational system of science

This is the *Pythagorean Theorem*. It was known centuries before it was so named. When it was first learned by natural philosophers/scientists, before **Thales** or **Pythagoras**, is unknown.

Thales used it; Pythagoreans later proved it. Geometry may be the most elementary science. It enabled Man, without the aid of gods, to calculate distances based on measurements of the physical world. It became the basic discipline for measuring all static objects. **Bertrand Russell**: "Geometry became the foundation for a rational system of natural philosophy that underpins Western culture to this day." It is the basis of trigonometry. (See 300 BC-Alexandria)

600 BC

Thales founded what is called the *Ionian school of natural philosophy*. Some members argued with him, using reason; thus developed the practice of philosophical argument and debate.

Milky Way

"**Thales** proposed that the bright band in the night sky known as the *galaxias kýklos* (Greek for "milky circle") might consist of distant stars/suns. **Galileo** confirmed this in 1610 with his telescope.

Thales saw that amber (solidified sap) rubbed against wool would attract light objects

(How? electrons transfer from wool to amber. Greek, elektron = amber).

This is electrostatic attraction, different from magnetism, which he also studied. As knowledge builds on knowledge, writing let people easily learn what those who came before them had learned.

Thales's
most
important
insight

Thales's big question: He saw that plants, animals, people change, but asked, "Is there anything that does not change?" He was the first known thinker to propose a single universal principle of the material universe, a substratum that underlay all change. His answer was water.

Wrong, but his significance and the most important insight in the history of knowledge is that he didn't resort to a supernatural explanation, but believed that the world could be understood rationally by the human mind. Also said, "The most difficult thing in life is to know yourself."

How
philosophers
think

Philosophy shares with scientific reasoning the process of clarification and argument. Philosophers present facts and explanations for their opinions, leading to new conclusions, that are hopefully more reasonable than competing views. **Thales** made knowledge public, not a priestly mystery.

The search for understanding is a deep human instinct for a few men, leading them to philosophy, science, and religion. **Thales** said that there was *order* in nature. Without matters occurring according to the laws of nature, there is no sense in studying nature. **Stephen Jay Gould**, "[T]he constancy of natural laws is the "methodological assumption" making science practical. **Arthur C Clarke**: "Human judges can show mercy. But against the laws of nature, there is no appeal." (1965)

600 BC
Thales
organized
knowledge

Thales's influence gave rise to the expression "thinking about the world in the Greek way," i.e., rationally. His idea to think about the world rationally spread to the tiny fraction of those who could read throughout the then known Western world, the world around the Med.

Thus, Greeks developed organized knowledge for literate persons. The world that **Thales** tried to understand was the world of things he could see and experience, not thoughts in people's minds. Due to **Thales**, natural philosophers posited various explanations for the true nature of the world. Greek thought was thinking in words. Greeks looked for certainty, general principles apart from the words of gods. Pre-Greek thought was undirected, thinking in images.

Hinduism
has no
central
controlling
priesthood

Hindustan / Hindoostan / Hindustan (land of Hindus) / India: Hinduism (with many philosophies and theologies with no central controlling priesthood) at the same time had an explosion of rational thinking. Six Hindu philosophical schools tried to answer fundamental questions like "what is real? How does X happen?" The Samkhya school of Hinduism believed there was no God and that the world was real due to the interaction between the two substances, *prakriti* and *purusha*.

The Yoga school believed in a supreme being (*Isvara*) and that the world was real. The Vedanta school saw reality as a single, qualityless, changeless *Nirguna Brahman* (the concept that Brahman is beyond time and space; that Brahman has no particular form and is present within all living beings and everywhere). The world was an emanation of Brahman.

600 BC.
Precise
dates
unknown

Morality: Good and evil are concepts whose origins are unknown. Acting altruistically pre-dates man. Many animals exhibit altruistic characteristics. Primate's babies, like humans, need care for a long time. **Zarathustra** (Gr. **Zoroaster**), a Persian religious reformer who challenged the then ancient Persian, becoming the spiritual founder of Zoroastrianism. He also influenced **Heraclitus**, **Plato**, **Pythagoras**, and the Abrahamic religions. He worshiped fire

Zoro-
astrianism
Good
vs. Evil

True religion was in Man's allegiance with the one true god, *Ahura-Mazda*, the only true god who fought against the evil *Angra Mainyu*. Such dualism appeared later in Manichaeism, Gnosticism and Christianity (i.e., Satan). **Zoroaster** believed the basic fact of existence was the of prophesied that a virgin-born savior would usher in a resurrection of the dead, final judgment, and final battle between two creative cosmic gods, a good god, *Ahura-Mazda* (Wise Lord, light, truth, frankness), and an evil god, *Angra Mainyu* / *Ahriman* (secrecy, cunning, darkness, diplomacy). These concepts were continued in later religions like Judaism, Christianity, and Islam.

Zoroastrian
afterlife

At the end of time, *Ahura-Mazda* will emerge victorious and all humans will resurrect. *Mithra*, an important Zoroastrian god, was a Sun god associated with *Sol Invictus*. No written scriptures about *Mithra* exist, only sculptures, so while *Mithra* is studied in academia, there is little consensus about him / it. Believers in *Mithra* reputedly earned eternal life in a heaven, sinners went to a hell.

Mithra was the mediator between God and Man. Mithraic liturgy includes, "He who will not eat of my body and drink of my blood so that he will be made one with me and I with him, the same shall not know salvation." Christians later adopted this ritual as the sacrament of communion.

Coincidentally, Mithraism likely originated in Tarsus, the birthplace of **Paul**.

600 BC **Atheistic** Philosophy, Lokayata: A materialistic hedonistic doctrine began to grow in Hindustan called Lokayata. It rejected tradition and magic and karma, held that the body and self were one, that morality is a natural phenomenon whose only purpose is to help life on Earth. Its scripture, Brhaspati Sutra, has been lost. Its adherents were called the Carvaka. They did not believe in an afterlife or any gods or karma or rebirth. They ridiculed the Brahmins as uncivilized ignorant fools who imagine that spirit is something different from the body that can go on after death.

594 BC **Greece: Solon the Lawmaker democratic reforms in Athens** Athens: (ref c620 BC) Fearing a revolt, Athens leaders gave power to **Solon** (c638-c559 BC), an aristocratic businessman. He laid the foundations for democracy. He moderated **Draco's** harsh laws. He cancelled all land debts, ended jailing for debts, instituted trial by jury, a constitution, a graduated income tax (The rich paid a rate twelve times that of the poor), gave the sons of dead warriors an education, devalued the currency, easing the burden of debt on debtors, legalized brothels, gave propertyless male citizens the vote in the assembly and on juries (not in the U.S. until the 1820s).

Greeks invented politics. Democracy in its most basic meaning, means a form of government where the people are the ultimate sovereign and all participate, directly or indirectly, in formulating the governing laws and actions of the unit of society involved. Greek "democracies," i.e., those with people having some voice in their government were however limited to free males, no women, slaves, freedmen, or even city-born Greek males whose father was born outside the city.

Practices now called proto-democracy were in Greece and in Sumer. American Indians also had governmental practices that were "democratic". (see *Indian Givers*, by **Jack Weatherford**) Greece advanced democratic features like deciding public affairs by discussion in a public setting.

586 BC **Anaximander, the laws of nature** Natural Philosophy / Science: Anaximander /Anaximandros (610-547 BC), also from Miletus, a student of **Thales**, also explained the world without reference to gods. He attempted to explain all things as arising from *apeiron*, or indeterminacy. He was an early proponent of science and tried to observe and explain different aspects of the universe, with a particular interest in its origins. He said that events were ruled by laws of nature.

A modern man, created a world map His philosophy covered many fields. In astronomy, he attempted to describe the mechanics of celestial bodies in relation to the Earth. In physics, he said that the indefinite (or *apeiron*) was the source of all things. He created a map of the world that advanced geography, with charts of the Med and the stars. It said that humans were at the center of an interconnected universe that ran without gods, and introduced a sundial to Greeks. He thought the Earth was a curved solid cylindrical mass suspended in space.

Very early concept of evolution. Anaximander's On Nature posited an accurate concept of evolution, not to be changed until Darwin. "Men first appeared as fish. When they were able to help themselves, they took to land." All things come from a single primordial source, unlike any known substances, infinite, eternal, ageless. If water or air were the primordial substance, it would have eliminated all the others, but through some intermediate creatures. He was the first to state what became known as the principle of sufficient reason. That is, there's a reason / cause for everything that happens. He believed that "justice" consisted of one not overstepping eternally fixed bounds, one of the most profound of Greek beliefs. He introduced the sundial to Greece. It had been used for centuries in Mesopotamia and Egypt.

580 BC **Scriptures were written in Babylonian exile. Monotheism provides a creator, a moral leader, and immortality.** Babylonians under king Nebuchadnezzar conquered Jerusalem, destroyed the Jewish Temple, exiled Jews from Judea to Babylon. Babylon became the center of Jewish culture. After this, a small circle of priests and scribes gathered around their exiled royal court, where they first developed the concept of YHWH (Yahweh) as the sole God of the world. In "Babylonian exile", many Jewish holy scriptures were put in writing, now part of the *Hebrew Bible*, derived from Arabian, Assyrian, Persian, Chaldean, Egyptian, and their own myths. Judaism was the first still existing religion to conceive the notion of a personal monotheistic God. The concept of ethical monotheism, which holds that morality stems from God alone and that its laws are unchanging, first occurred in Judaism, but is now a core belief of most modern monotheistic religions, including Zoroastrianism, Christianity, Islam, Sikhism, and the Bahá'í Faith.

God's laws don't change. Monotheism provides three rational and spiritual necessities. 1. An absolute eternal creator. 2. An all-knowing, all good leader. And most important, 3. a deliverer from death and guarantor of immortality. The one large theme in the *Hebrew Bible* is man's nature and destiny in the face of God. The then contemporary polytheistic pagan religions had rituals, but Judaism had scriptures and ethical teachings.

586 BC Before 586 BC, Jews had suffered numerous disasters. Rabbis said it was Yahweh's (originally YHWH) punishment for their apostasy (not being holy enough). Blaming the victim is not uncommon in Judaism. Jews were always God-obsessed, believed the purpose of life was to serve God and prepare for the world to come (like Egyptians). Life is a gift from God.

Chosen people Jews knew that they were the "chosen people" as the Lord had chosen them to be a special people unto himself, above all people who are on the face of the Earth *Deut.* 7:6, because:

1. They were given the law (the *Ten Commandments* and the *Torah*).
2. They had an eternal covenant with God that He would never desert them.
3. They were to witness to the world that God is and will be forevermore.

Pagans at the time had good and evil gods who caused good and suffering.

Jews said humans alone were responsible for their acts. Judaism expected that a Messiah would come and deliver them from their suffering, and so was largely indifferent towards unbelievers.

Several cultures have a "chosen people" concept. See Chosen People in the Index.

550 BC Natural Philosophy: Anaximenes (c585-c528), third of the Miletean philosophers, agreed that one substance called *aer* underlay all matter. And all things were made up of *aer* in different densities. When dense, it was water. Fire was rarified *aer*. Like **Thales**, he said rainbows were natural, not divine. The three philosophers started a radically new and consequential approach to understanding the world.

Golden Rules The Golden Rule: Many cultures have a *Golden Rule*: Hinduism, Mahabharata (1517). Buddhism, Udana-Varga 5,1. Zoroastrianism, *Shayast-na-Shayast* 13:29, Judaism, **Hillel**, What is bad to you, do not to others; that is the entire law; all the rest is commentary. *Shabbat* 31.1. **Socrates / Plato**, *The Republic*, 11:913. **Confucius** (*Analects* 12:2 and 15:24), **Aristotle**, **Jesus** Luke 6:31, *Matthew* 7:12, **Epictetus**, **Mohammed** -The *Qur'an*, *Surah* 59. Baha'i, **Wycliffe**, **Spinoza**, *The Egyptian Book of the Dead*, **Thomas Paine**, Give to every other human being every right you claim for yourself." Shawnees, Jainists, *Sutrakritanga* 1:11:33. But, **Kant** 1751 and **George Bernard Shaw** (1916), saw a flaw.

.540 BC Greek Philosophy: The next stage of Greek philosophy was more religious / moral, less scientific. **Olympic gods aren't real** **Xenophanes** (c570-475 BC) a poet from Colophon, traveled throughout his life, denied the Olympian gods existed, thought the idea of those gods was silly, but did believe in one god greater than all other gods. "He sees over all, thinks over all, hears over all . . . without toil sets all things in motion by the thought of his mind." He said also that rainbows were natural phenomena, a kind of cloud.

Fossils, paleontology He speculated that as sea shells were found on mountain tops, mountains must have once been under water, perhaps from the flood. He criticized Greeks' anthropomorphism, i.e., describing Greek gods like themselves. "If horses could paint, they would paint gods as horses. Ethiopians' gods are black and snub-nosed; Thracians' gods have blue eyes and red hair." (Thracians were redheads.)

Greek culture Greek culture: Greek art was more human than the Egyptian archaic frontal style. While Greek painting was an adaption from other cultures, Greek sculpture was new, realistically human.

Greeks had several concepts of love: 1. the generative principle of the cosmos, 2. *philia* / friendship [Philadelphia, city of Brotherly Love], 3. the emotional attraction, 4. *eros*, akin to sexual love, the torment of a passion, 5. sexual relations, and 6. *agape*, love of god and his creatures.

Diplomacy International Relations: Thebes, Athens, Macedon, Sparta, Phoenicians, Rome, Etruscans Persia, Syracuse (Sicily), Carthage, Corinth, all fought one another intermittently and entered into treaties governing commerce, property, naturalization, status of aliens, right of asylum, extradition, and diplomatic privileges. Carthage, a Phoenician settlement, grew to rival Rome. It had a Senate, an assembly, two elected kings.

545-490 BC Natural Philosophy: Pythagoras (c580- c.490 BC) of Samos, intellectually one of the most important persons who ever lived, was superstitious, but was one of the first to say Earth is a sphere, based on seeing the shadow of the earth during a lunar eclipse (but it may have been a member of his school). He was religious, but antagonistic toward the Greek gods, who were as immoral as humans.

Women were equal **Pythagoras** founded a group of disciples / scholars (Pythagoreans), in Crotona, Italy. They treated women as equals, property was held in common, scientific and mathematical discoveries were deemed collective. They led a simple life. He was concerned with the immortality of the soul. He said, "The soul of Man is divided into three parts, intelligence, reason, and passion. Intelligence and passion are possessed by other animals, but reason by Man alone." He combined math and philosophy.

Math, the 2nd great advance in human thought	Pythagoras's big insight, that <u>there's something about the real world that is intelligible in mathematical terms</u> , is probably <u>the second great advance in the history of human thought</u> . He thought mathematics was the key to understanding the universe, the world was a rational ordered whole, but unfortunately wrongly felt that numbers could have real influence on material things; that things are numbers and vice versa, verging on nonsense numerology. <u>They tried to explain the world in terms of whole number ratios.</u>
545-490 BC	He was the first to propose a rational theory of the universe, that God had created the universe, not in a haphazard fashion but according to <u>certain rational principles that humans can understand</u> . The universe had Earth at the center, and the planets and stars followed certain physical laws that could be expressed numerically. <u>Pythagoreans said the Earth rotated on its axis.</u> Philolaus , a Pythagorean, suggested that the Earth orbited the Sun. But, he wrongly said planets orbited the Earth on crystalline spheres. Pythagoreans discovered that the length of a vibrating string was proportional to the notes it produced, and believed that the whole universe was based on a mystic order, or cosmos. He is incorrectly credited with the idea of the music of the spheres. Said, "Reason is immortal, all else mortal." <u>He put knowledge and science as a path to salvation.</u>
First to propose a rational theory of the universe.	
Earth orbits the sun	
	Bertrand Russell (1872-1970, ref 40K BC) said, "Due to Pythagoras , mathematics is the chief source of belief in eternal & exact truth. <u>But for him theologians would not have sought logical proofs for God.</u> "
Geometry advanced thinking	After Pythagoras died, his disciples were credited with the proof of what came to be called the <i>Pythagorean Theorem</i> (for a right triangle, the square of the hypotenuse equals the sum of the squares of the other two sides). The theorem itself had also been known to the Babylonians 1,000 years earlier. .
Right triangles	<u>Right triangles are the basis of trigonometry.</u> The Pythagorean movement as such died out as they could not understand or accept the concept of irrational numbers, like π (pi), i.e., a number that could not be expressed as a ratio between two whole numbers, like 1/3. [try 355 /113]. They said that three kinds of people went to the Olympics, merchants, the lowest rank, then athletes, and highest, spectators/thinkers.
530 BC	Philosophy, China: <u>Confucianism has no gods, thus is not a religion</u> , merely an ethical system. It has ancestor worship, but not as deities. Harmony, and justice are its central ideas.
Confucius	Confucius , a conservative, stressed the importance of a central government and filial piety. The ideal relationship among human beings is <i>jen</i> (humanity or goodness), the perfect virtue of men <i>The Analects</i> is a collection of his sayings and teachings. It stresses leading by example, personal and societal morality, filial piety and treating others with respect and kindness.
Confucius	Said, "Where wealth is centralized, the people are dispersed. Where wealth is distributed, the people are brought together." His teachings gradually became China's official state doctrine. He disclaimed a divine inspiration and had no interest in cosmology (the origin and structure of the universe). He taught respect for the individual in a time when life was cheap. <u>"When a country is well governed, poverty and a mean condition are things to be ashamed of..</u> <u>When a country is ill governed, riches and honor are things to be ashamed of."</u> <i>Analects</i> 8
Superior men know what's right. Inferior men know the price.	<u>The superior man understands what is right; the inferior man understands what will sell.</u> He does what is proper to his station in life; he does not desire to go beyond this. In a position of wealth and honor, he does what is proper to a position of wealth and honor. In a poor and low position, he does what is proper to a poor and low position." Confucianism is practical, social, ethical, full of advice on behavior, more code than creed, without church or clergy.
Confucius	Philosophy: Confucius taught that all eminence should be based entirely on merit (ability and moral excellence, namely learning Confucian texts), <u>except</u> for the hereditary ruling imperial family. One's birth in theory meant nothing, but due to the complexity of the Chinese written language, only wealthy children had the means to learn to read and write, and thus the wealthy class perpetuated itself.
.530 BC	The prevailing feudalists could thus live with the meritocracy myth <i>and</i> bequeath their positions to their literate sons. Confucius assumed people were unequal, measured by their understanding of written Confucian texts. <u>Confucius was more concerned about the fate of society than the souls of its inhabitants.</u> Modern Confucian scholar Tu Wei-Ming , "We can realize the ultimate meaning of life in ordinary human existence . . Real knowledge is to know the extent of one's ignorance." (Like Socrates)
	Confucius's sayings were later collected in a book, <i>the Analects</i> , then incorporated into the <i>Thirteen</i>

Analects Perfect Virtue	Classics, which were to China as the <i>Bible</i> was to the Christian West, to teach Chinese officials how to rule. <u>"To be able to practice five things (gravity, generosity of soul, sincerity, earnestness, kindness..bold faithfulness, and sincerity everywhere under heaven) constitutes perfect virtue."</u>)
Confucius Quotes	"Those who know the truth are not equal to those who love it." "The essence of knowledge is, having it, to apply it; not having it, to confess your ignorance." "The superior man thinks of virtue; the small man thinks of comfort." "The proper man understands equity, the small man understands profits." <u>The Analects' principal ideas were: Jen</u> , the ideal relationship among men, is the perfect virtue. Man is basically close to <i>jen</i> by his very nature, but his actions should be controlled by the rules of propriety. The ideal person is one who practices <i>jen</i> in accordance with propriety, so they seek the <i>Tao</i> , the right way.
530 BC	
Wisdom, courage, compassion	Confucianism stressed the relationship between persons based on proper behavior and sympathetic attitude. His " <i>Golden Rule</i> ," "Do not impose on others what you do not wish for yourself." <i>Analects</i> 12:2 and 15 24. "Wisdom, compassion, and courage are the three universally recognized moral qualities of men". "The cautious seldom err." <i>Analects</i> 4:23 [or get much done]. "Coercive government is fiercer and more to be feared than any tiger." Education was the key to advancement in China from earliest times. Confucius's exception for the ruling family from the merit qualification was a politically expedient compromise like Socrates's <i>Royal Lie</i> (see 420 BC) and St. Peter's later instruction to obey all human authorities. <i>1 Peter</i> 2:13-14, 17.
	The Chinese only used iron weapons 200-300 years after Assyria, Egypt, and Europe. Chinese planted crops in rows, hoed weeds, used manure for fertilizer, not done in the West for 2,000 years.
530 BC	The Persian empire arose under Cyrus the Great , a Zoroastrian. He conquered Babylon, allowed the Jews there to go back to Jerusalem, although many stayed in Babylon. With 40 million people, Persia was far larger than all the Greek city-states. Scribes wrote for king and commoner (normally both illiterate), becoming powerful.
528+ BC	Philosophy: Siddhartha Gautama (c563-c.483 BC), became known as the Buddha (Hindu title for the Enlightened One). Born wealthy in Kapilavastu, Nepal, at 29 he left his wife and infant son to wander for 15 years and think. In 528 BC, he said he had found the way out of the eternal cycle of birth, death, and rebirth, attained the Awakening, and realized the Truth. All acts, good and bad, have consequences.
The Four noble truths	Longing, hate, and ignorance lead to new suffering. To break this chain, one must release all passions. <u>Thus, the Truth consists of four "Noble Truths,"</u> namely: 1. Man's existence is full of sorrow / duhkha, (and we are doomed to an eternal cycle of death and rebirth unless we find Nirvana /obliteration of desire / selfishness,
Noble eightfold path	2. <u>Man's sorrowful condition is due to Man's craving (trishna), i.e., three selfish Desires: namely</u> a. desire to gratify the senses, b. Desire for personal immortality, c. Desire for prosperity, worldliness, 3. But, Man can find emancipation and freedom from desire/selfishness, gaining nirvana 4. By seeking the middle way between self-indulgence and self-mortification, known as the " <u>Noble Eightfold Path</u> ," namely: 1 Right Views (truth) 2. Right aspirations 3. Right Speech 4. Right Conduct. 5. Right Livelihood. 6. Right Effort. 7. Right Mindfulness, and 8. Right Rapture /Concentration..
528 BC	
A sin to claim supernatural powers	As no god was involved, Buddhism is an ethical doctrine, not a religion. But a theology developed about Gautama that he was a god. Similar to <i>Lokayata</i> , both Buddhism and Jainism began, in a sense, as Hindu reforms that explicitly rejected much of the <i>Vedas</i> , particularly their supernaturalism. Gautama specifically disclaimed any interest in the mystery of creation. He said that it was a sin against right living for anyone to claim supernatural powers.
Gautama Quotes	"When man has pity on all living creatures, only then is he noble." "All desires must be overcome before Man can become serene. Men must lose themselves in something greater than themselves." <u>"Believe nothing, Oh monks, merely because you have been told it . . . or because it is traditional, or</u> because you have imagined. Do not believe what your teacher tells you merely out of respect for the teacher. But whatsoever, after due examination and analysis, you find to be conducive to the good, the benefit, the welfare of all beings—that doctrine believe and cling to, and take it as your guide."
528 BC	
Social equality	<u>Gautama's idea of social equality</u> contradicted the Hindu caste system taught by the ruling Brahmins. His ideas spread across Hindustan, and then to East Asia. The Hindu Brahmins, by the 11 th century AD,

however, drove egalitarian Buddhism out of Hindustan, but many Buddhist ideas remained in Hinduism.

Three areas of thought

Buddhism's emphasis on social equality, its doctrine that many human ills are caused by poverty, have inspired reform movements & anti-colonial nationalistic movements in many countries. **Gautama** focused on suffering, but ended up denying the existence of the self, only events exist. He saw no special virtue in fasting. He said, "The root of suffering is attachment." Said, "Happy is he who has overcome his ego."

The Buddha doesn't favor those who ask him. Meditation leads to self control, purification and enlightenment. "All things appear and disappear because of the concurrence of causes and conditions. Nothing ever exists entirely alone; everything is in relation to everything else."

Buddhism and *Jainism*, both atheistic, like *Hinduism*, believe reincarnation is a basic principle of the universe, and both sought to escape from the circle of births and deaths through correct knowledge and conduct. . **Gautama** and **Lao-Tse** advised followers to turn the other cheek. **Jesus** later adopted this. The path **Gautama** taught is primarily a study of your own mind and a system for training your mind. **Gautama** never referred to himself as *the Buddha / the Enlightened One*. Like Confucianism, Buddhism is a philosophy of conduct, not rituals and sacrifices to a deity.

516 BC Jews, freed by **Cyrus** from Babylonian exile, returned to Jerusalem and began to rebuild their temple.

Atheistic Jainism

Philosophy: **Mahavira** (c. 540-c. 468 BC) founded atheistic *Jainism*, promoted self-discipline above all else. *Jainism* opposed the formalism of *Hinduism*. Gods, sacrifices, and rituals were non-existent or irrelevant. The universe goes in and out of existence.

Following the ascetic teachings of *Jina*, one achieves enlightenment /perfect knowledge.

The meaning of life is to use the physical body to achieve self-realization and bliss. *Jainism* is understood as atheistic, thus not a religion. It rejected the Hindu gods and had no supernatural replacement. Everyone is responsible for his actions and all living things have an eternal soul, jiva.

Jainism includes strict adherence to *ahimsa*. a form of non-violence that goes far beyond vegetarianism. Jains refuse food obtained with unnecessary cruelty.

509 BC In Italy, Rome revolted, won independence from the Etruscans, and formed a republic with a ruling Senate, not elected, just the 300 wealthiest men. They paid no taxes. Slaves could not be citizens.

The Senate ruled, but tribunes, representatives of common citizens, were also in the government. The city motto was *Senatus Populusque Romanus*, The Senate and People of Rome. Families were the basic units of society. Worship of family gods was important. As in Greece, slaves did the work.

Athens

Greece: Athens was then a Greek city of no particular distinction. It was not the largest or richest city.

Sparta

Sparta, one big army camp . However, the Greeks had a common language and religion, paganism with numerous gods. Militarily, the Greeks developed the phalanx, a mass of citizen /farmers/ infantrymen in close formation with overlapping shields, virtually unstoppable. Cavalry couldn't defeat it. It broadened the class of citizens who took part in *polis* affairs. Basic education was for all free men. Beyond that, tutors or teachers. Athens had a public library in 477 BC. Athens owned 300 Sythians who they used as their police force. Athens didn't hire its police force. It bought it.

Athenian democracy (But only for free city-born males)

Political Theory, democracy: **Cleisthenes**, ruler of Athens, further advanced democracy. He put all citizens (free property-owning city-born males) in ten new tribes, each of which chose 50 members by lot each year for a new council of 500, which ran Athens's foreign and financial affairs and prepared matters to be debated and voted on by the assembly / town meetings, i.e., male citizens, demos, only.

Athens thus became a limited direct democracy of sorts, at its peak, with c260,000 inhabitants, c50,000 citizens, and c100,000 slaves. The Greek *polis* / town was the model for the later basic principle of European society, the territorial state over other principles of social order.

The social class division of societies.

Political Theory, how communities organize:

Martin Luther, Some must be free, others serfs, some rulers, some subjects. One must be hard with [the common people], see that they . . . work and that under the threat of the sword and the law they obey.

Edmund Burke The division of society is rich and poor." "The whole business of the poor is to administer to the idleness, folly, and luxury of the rich.

Alexander Hamilton, All communities divide themselves into the rich and well born, and the mass of people.

John Adams, "There must be one indeed, who are the last and lowest of the human species."

Miguel de Cervantes Saavedra, (*Don Quixote*) "*The Haves and The Have Nots.*"

Madison, Those who hold and those who own no property have ever formed distinct interests in society.
Adam Smith, economist, the two social factions represent “self interest and social interest.”
Henry George, philosopher, “*The House of Haves and the House of Want.*”
David Ricardo, banker, “The interest of the landlord is always opposed to the interests of every other class.”
Karl Marx, communist theoretician, the struggle between the dominating and dominated social classes.
Eugene V Debs, socialist, the Master Class and the Subject Class.
Frederick L Schuman, political scientist, “All literate human societies . . . have been pyramidal or hierarchical in the distribution of indulgences and deprivations among its members. The few enjoy maximal individual shares of wealth, income, prestige or influence . . . Every such society has at the bottom of the social scale a multitude of the poor, each receiving the minimum individual shares of available satisfaction.” (More **Schuman**, AD 400, 1532, 1750, 1939, pp. 396, 442)

504 BC
All is flux.
The problem of change

Philosophy: Heraclitus (c.535-c. 475 BC) of Aphesis, a Greek port in Anatolia, was one of first dialectic philosophers (dialectic: *the investigation of the truth of opinions, especially by logical discussion*) .

He shifted the focus of Greek philosophy from what *things* consisted of (**Thales, Democritus, Anaximander**) to the problem of change. **Heraclitus’s** chief idea was that “All is flux.

Everything flows and nothing stays. You cannot enter the same river twice. War and strife between opposites is the eternal condition of the universe. Nothing endures but change.”

Reason:
We know what forces do, but not what they are.

For **Heraclitus**, fire, symbolizing change, was the basic reality as well as his answer to **Thales’s** question for an unchanging substance. To his idea of fire he added the idea of reason as the universal law. Change was not a haphazard movement but the product of God’s universal reason (*logos*). He said, “All force and matter are the same force manifesting itself in a variety of ways, that’s God.” “The one is the many; being is becoming; substance is change.” “A man’s character is his fate.” “The soul was a mixture of fire-noble and water-ignoble.” We know what forces do (we measure them) but not what they are. (Maybe what they do *is* what they are.)

Nothing ever changes
metaphysics

Philosophy: In contrast, Parmenides (c515-c.480 BC), in South Italy, the most Indian of the Greek philosophers, said that nothing ever changes, that there is only one, infinite, and eternal and indivisible reality, and we are part of this unchanging *One*, despite the illusion of a changing world from our senses. He was a skeptic particularly about the unity of reality.

He invented *metaphysics* based on logic, said the senses were deceptive, and condemned the multitude of sensible things as mere illusions. The only true being is “the One,” which is infinite and indivisible. It is not a union of opposites as there are no opposites. “Dark” is just “not light.”

Parmenides’s teaching had two parts, the way of truth and the way of opinion.

When one thinks, he thinks of *something*. When one uses a name, it is the name of *something*.

Thoughts and language require objects outside themselves.

The ultimate reality of the universe was simply the stable fact of being, which didn’t require gods.

500 BC **Philosophy, Lao-tzu:** founded Taoism. wrote *Tao-te-Ching, /The Path of Virtue*, in China, with a main God, *Yu-huang*, the Jade Emperor. Simplicity, patience, compassion, were man’s three greatest treasures. Lesser gods report to him. He distributes justice, using Hell. It means the cosmic order of nature that cannot be grasped by human intellect.

Lao-tzu focused on nature. Taoism is mystical, devoted - even more than Buddhism - to transcending everyday life and finding the Tao, the universal way of things, the all pervading principle of all that exists; the virtue of power of every individual is a manifestation of Tao.

In *Tao*, the meaning of life is to realize the temporal nature of the existence, and one is expected to live simply, conduct one’s life by way of *Xiuzhen /Xiushen*, as a preparation for the spiritual transcendence thereafter. The Tao is the infinite potential energy of the universe.

Qi is vital energy in constant flux that arises from the Tao. *Qi* is regulated by the opposites of *Yin* and *Yang*. Everything is made of *Yin* and *Yang*. “He that knows others is wise. He that knows himself is enlightened.”

500 BC The four major civilizations of Eurasia, 1. Greek, 2. Mid-East, 3. Indus and Ganges Valleys, and 4. China developed separately in rough balance. (Europe’s dominance, *The Rise of the West*, came 2,000 years later.) Slavery and male superiority were the norm in all societies.

Shinto Shinto, native religion to Japan, and a form of national patriotism, started around 500 BC,

perhaps earlier. The origins of its beliefs are unknown. *Shinto* says Japan is a divine country; the emperor is a descendant of the gods. *Shinto* has thousands of spirits known as *Kami*, who are paid tribute at shrines. Shinto has no overall dogma, but adherents must remember and celebrate the *Kami* spirits, remain pure and sincere, and enjoy life

Shinto sees death as pollution and regards life as the realm where the divine spirit seeks to purify itself by rightful self-development. *Shinto* dealt with ordinary lives. There was no word for *Shinto* until *Buddhism* was made a state religion in 604 and *Shinto* had to distinguish itself from *Buddhism*. *Shinto* is non-exclusive. One can be Christian and *Shinto*.

Greek Drama: The Arts, Greek Drama: developed out of Greek worship ceremonies to the god of wine, Dionysus, (He could turn water into wine), where one actor recited lines as Dionysus and a chorus (representing the people) responded. **Aeschylus** (c.525-465 BC) invented drama by introducing a second actor into his plays. His plays dealt with age-old problems of the conflict between humans and gods. He wrote *Agamemnon*, whose hubris led to his death. Said, "Fear is stronger than arms." His play *Prometheus Bound* had many themes strikingly similar to the *Book of Job*

490 BC Culture, The Greeks were mariners and explorers. The sea was their home. While Athens is known for big things, like democracy, philosophy, and its Olympics, its military skills made them possible.

Athens was not the dominant Greek city, but due to the victory over Persia, and in contact with other cultures, it became the focus of Greek civilization. From c.490 to 300 BC, the center of Western civilization shifted from Mesopotamia / Persia to Athens. Athens dominated the Med. trade.

Thought shifting to humans Philosophy: Before **Socrates** (around 420 BC), no great Greek mathematicians or philosophers were Athenians. Athens had limited democratic features. Women could not own property or vote. In Sparta, women could. Due to the Greek philosophers, reading and writing first escaped from the temples and king's court, and was the first small beginnings of the free intelligence of humans. Greece's "Golden Age" started. Greek art and writings portrayed Greek gods as super humans.

490-480 BC War: Persia, then the largest Western empire, under Darius 1, in 490 BC, attacked Greece. This united the Greek cities. At Marathon, 26 miles from Athens, the Greeks won. In 480 BC, the Persians tried again, but the Greek fleet and the Greeks' cities armies won. Athens had 200 new triremes (three levels of rowers), who were outnumbered but outmaneuvered the Persian boats and won. The Greek victory separated Greece from Asia. It could be considered the beginning of "Western Civilization".

Natural Philosophy, Medicine: **Alcmaeon** was the first to dissect humans, saw the optic nerve and the Eustachian tubes, saw the difference between veins and arteries, recognized the brain as the seat of intellect, and the connection between the brain and sensing organs. He said that health was a balance between opposing humors, and that illnesses were caused by the environment and lifestyle.

450 BC **A rock showed planets weren't gods** Natural Philosophy: The basic idea that matter is made up of tiny indivisible particles is an old idea that appeared in many ancient cultures. **Leucippus** (c.490-c.430 BC) probably from Miletus, formulated an *Atomic Theory* of matter. The idea was based on philosophical principles, not science. He said that all natural objects are composed of infinitesimally small particles he called seeds, each containing mixtures of all qualities in differing proportions

Leucippus was the first to say categorically that every event had a natural cause.

Anaxagoras (c.500-428 BC), from Asia Minor, last great Ionian philosopher, first philosopher to move to Athens, emerging as the cultural center of Greece. He was the first to introduce a dualistic explanation of the universe. He tried to explain meteors, eclipses, rainbows, the Sun rationally. He was the first to describe a conflict between natural philosophy and the gods. He saw a fallen meteorite and concluded that the heavenly bodies were not gods but lumps of metal like on Earth. He taught **Pericles the Orator**, the famous ruler of Athens from 460-429 BC.

Mind and Matter **Anaxagoras's** main contribution was the concept of mind / nous as distinguished from matter, as an ordering force of physical change, a major development in philosophy. He taught **Leucippus's** *atomist* explanation of universe (below) and said that the Sun was the size of southern Greece.

He said the Moon had mountains and shone from reflected sunlight and that the Sun was made of hot iron constantly emitting light and heat. He rejected **Empedocles's** theory of four elements, earth, air, fire, and water, and proposed an infinite number of elements.

Teleological / Design Argument	His “ordering force” that gave sense to the changing Earth was the first iteration of the <i>Design / Teleological Argument</i> , i.e., there’s no <i>natural</i> explanation for the order in the world, so we <i>infer</i> some <i>supernatural</i> entity must have <i>designed</i> it. <i>Teleology</i> means <i>purpose</i> . Aristotle (335 BC) later adopted and made the <i>Design Argument</i> well known. It is an <i>argument by analogy</i> , and an <i>inductive</i> argument (where the conclusions are not <i>certain</i> but depend on how strong their premises are). (Analogies can be helpful to understand a new concept, <u>but only if they compare similar situations.</u>)
Early concept of evolution	<u>Biology, evolution:</u> Anaxagoras, like Anaximander (504 BC), believed that humans were, in the beginning, like another animal, namely a fish. His answer to Thales’s question (What is unchanging?) was air. Anaxagoras regarded the conventional Greek gods as mythical abstractions with human qualities i.e., anthropomorphic. He was the first person known to be indicted for impiety / atheism, probably a law designed to target him. Pericles spoke for Anaxagoras at his trial and he was saved, but he was forced into exile.. <u>Epistemology:</u> Anaxagoras was a contemporary of Leucippus. said, “Nothing can be known; nothing can be learned; nothing can be certain; sense is limited; intellect is weak; life is short.” .
450 BC Earliest known theory of atomism	<u>Natural Philosophy, Leucippus’s atomic theory:</u> (Greek <i>atmos</i>=indivisible, unbreakable). The mind, or intelligence, acts upon masses of these particles to produce objects we see. His pupil Democritus (c.460 -c.370 BC), on 430 BC elaborated and expanded on his <i>seeds</i> theory. “The first principle of the universe are “atoms and the void”. Everything else is merely thought to exist.” Leucippus had the correct (but unproven for millennia) answer to Thales’s question before Greek philosophy turned from studying nature to studying humans under Socrates and Plato. Metrodorus of Chios, a possible student of Democritus, “We know nothing, no, not even whether we know or not”
China 450 BC	<u>Philosophy: Mo-tzu (479-438 BC)</u> Chinese, taught universal love for the common plight of ordinary people; a doctrine of social equality, reputedly the first to do so. He also posited a law of inertia. Chinese used iron plows, acupuncture, saw sunspots, wrote a definitive atlas of comets c.400 BC. Mo-tzu developed the crossbow around this time; it could penetrate armor.
Sophism: He believed wisdom could be taught.	<u>Philosophy: Protagoras (c.481- c.420 BC)</u> of Abdera, Thrace, N W Greece, a founder of sophism and likely <u>the most influential <i>Sophist</i></u>. Plato quoted him, “<u>Man is the measure of all things</u>, of things are, that they are, and of things that are not, that they are not.” That is, our knowledge is measured by how we perceive it. Wind may feel cold to one person and warm to another. Both persons are correct. <u>This doctrine is at the heart of relativism.</u> He believed that wisdom could be taught. As a <i>Sophist</i>, he taught that self-interest was the only valid end. He was also the first to systemize the study of grammar, parts of speech, etc.
Protagoras was indifferent regarding the gods	<u>In his book <i>Concerning the Gods</i>, he wrote, “As to the gods, I cannot say whether they exist or not.”</u> He did not prevent anyone from worshiping the gods as it was a politic thing to do and made for a stable society. He is remembered for three reasons, 1. his conviction that there is an eternal and unchanging “absolute standard” as to what is good and right, 2. the belief that nature works toward a purpose, that to discover this standard, humans must know themselves, and 3. his “Socratic method” of questioning everything and everyone he meets. He was accused of impiety and exiled. As he sailed into exile, he drowned.
450 BC Empiricism	Sophists were probably the first <i>Empiricists</i> in Western philosophy. It is not a static concept. Within <i>empiricism</i> different philosophers have different emphases and refinements. For example, some hold that knowledge can come indirectly from experience. The role of our senses can differ as well.
Sophism, Secular humanism	<u>Philosophy, Sophism: Athens became the center of a new kind of teacher, the <i>Sophists</i>.</u> They taught young men how to argue logically and knowledge to advance in a democratic <i>polis</i>. This encouraged independent thought..<i>Sophists</i> rejected earlier Greek philosophers’ speculations about the nature of the universe and the place of gods. .
Sophists rejected myths	<u><i>Sophists</i> had a relativistic attitude toward moral values</u> and thought that the <u>only sensible object of study was human behavior</u>). <i>Sophists</i> caused Athenians to consider whether their ideas and customs were founded on truth or simply conventional ways of behaving. <i>Sophists</i> rejected the rationalistic <i>speculations</i> about the nature of the world in favor of focusing on observation of events and phenomena.

Sophists used skeptical arguments, using readily seen and observed examples to undermine earlier philosophers' theoretical claims based *solely* on reason. They were the first *Humanists*.

449 BC **Romans copied Greek culture** Concurrently, Rome prospered, copied Greek culture but kept its own language, adopted and renamed the Greek gods. *Zeus* became *Jupiter*, *Hera-Juno*, *Ares-Mars*, *Poseidon-Neptune*, *Aphrodite-Venus*, *Athene-Minerva*, *Eros-Cupid*, *Artemus-Diana*, *Apollo* stayed *Apollo*).
Themis was the god of divine or natural law, order, and justice. Her name means justice.

She was also credited with wisdom, foresight, and prophecy. She knew secret mysteries unknown even to Zeus. She protected the oppressed. Rome never dealt with other states as an equal. It adopted Greek philosophy, drama, the Macedonian order of battle, Spartan armor, and a modified Greek alphabet. Rome never had many philosophers like Athens.

12 Tables of Laws Political Theory: Romans studied **Solon's** laws, and, around 449 BC, codified their *Twelve Tables of Laws*, which became a great legal system with justice and a *bill of rights* for all citizens.

Separation of powers, instituted first by the Greeks, was also contained in the *Twelve Tables*. Roman legions erected their *Twelve Tables* where they conquered. The *Twelve Tables* remained in use until the fall of Rome in the West (c.420 BC) and until 1453 in the Eastern part of the empire ruled from Constantinople. Gods were sacrificed to it for the sake of the state.

440 BC Natural Philosophy (science): **Empedocles** (c.490-c.430 BC), born in Sicily, said air was a separate substance. He accepted the theory of the four classical elements, earth, air, fire, and water (propelled by the opposite forces of love and strife), which made all matter when mixed in different proportions. Love and strife explain change.

He described a force What holds the Earth together? Force. There are four kinds of fundamental forces that explain the nature of matter, from the tiniest particle to the galaxies of the universe. We will discuss them as they arise. (Strong interaction, electromagnetic interaction, weak interaction, and gravity. They will be discussed as they arise) **Empedocles illustrated centrifugal force** (the force where a moving object whose natural tendency would be to keep moving in the same direction, (i.e., obeying a natural law of motion, inertia,) see 1687) is constrained by a cord held by a twirler to move in a circle and [;pulls on the cord in the direction along its radius).

In other words a rock being twirled around pulls outward. The cord holding the twirling rock prevents the rock from moving in a straight line, i.e., its *inertia*. Release the rock, it goes straight and gravity (a weak force) eventually pulls it down where the ground stops its inertia.

He said that the Moon shines by reflected sunlight, that the speed of light is finite, that the gods should not be imagined with human form. He believed in reincarnation. He wrote his thoughts in verse.

435 BC **Age of Pericles** Political Theory, democracy: The Age of **Pericles** (c.495-429 BC) was the grandest time in Athenian history. He ruled from 460-429 BC. He started pay for jurors and council members, completed the city walls, promoted artistic and scientific matters. Under him, Athenians became deeply attached to their (limited) "democracy." He put all non-disenfranchised males in the Assembly.

Democracy: Everyone is equal before the law. **Pericles** made Athens powerful and the center of art and literature. He had the temple Parthenon built on the Acropolis (completed 432 BC) and other great works. He decreed that Athenians could not marry foreigners (his mistress was a foreigner). He led Athens and its allies to fight Sparta and its allies in the Peloponnesian Wars 431-404 BC. Sparta, with Persian money, finally won, but all parties were severely weakened. After the first year of the war, 430 BC, **Pericles** gave an eloquent funeral oration for those who had died. He extolled democracy. "Power is in the hands not of a minority but of the whole people. Everyone is equal before the law. Our political life is free and open."

430 BC **"History" began** History: Writing was first used for centuries to record commercial events. **Herodotus** (484 BC-425 BC) invented "history" by telling *why* big events occurred. He researched well, told a coherent story, traveled widely and got eyewitness accounts, had an eye for good anecdotes, and got both sides of events. He was obsessed with *hubris*, how great men might be tainted by arrogance that would anger the gods. His *History* explained how Greeks beat the more numerous and better armed Persians twice: 1. Persian arrogance, 2. The Greeks were fighting for their homes, their city, and 3. Persian soldiers were slaves, with no stake in their position. **Herodotus** believed that the gods intervened in wars. He also showed Hindustani cotton to Greeks.

How Greeks defeated the bigger Persia.

Writing is **H G Wells**, *The Outline of History*, "Writing has the ability to put agreements, laws,

crucial to societies developing commandments on record.” “It made the growth of states larger than the old city states possible. It made a continuous historical consciousness possible. The command of the priest or king and his seal could go far beyond his sight and voice and could survive his death.”

430 BC **Atomic Theory.** **Democritus** (c.460-c.370 BC) of Abdera, student of **Leucippus**, contemporary of **Socrates**, father of *materialism*, traveled widely (Egypt, Ethiopia, Hindustan). **Democritus** was the first to say every event has a natural cause and thus paved the way for a coherent theory of motion and change. Said, “Everything in the universe is the fruit of chance and necessity.” “As nothing can come of nothing, and change really occurs, and motion requires a void, reality must consist of atoms moving in a void.” Like **Leucippus**, he answered **Thales’s** question by postulating *Atomic Theory / Atomism*. “Nothing exists except atoms and empty space; everything else is opinion.”

Atomism was a great insight, but it was based on philosophical reasoning. *Atomism* fulfilled Ionian philosophy. There was no real evidence for it until the 19th century. *Atomism* was the most modern theory advanced in the ancient world, but soon forgotten when it conflicted with **Aristotle** in 335 BC.

Democritus correctly said there’s no purpose in nature, an idea **Aristotle** later incorrectly disputed. He also said that we live in an infinite universe, with many worlds. He felt that dreams of gods were evidence of *some* unknown force in the universe, but not gods.

Milky Circle **Physics, Astronomy:** Like **Thales**, **Democritus** speculated that the bright band in the heavens known as the *galaxías kýklos / Milky Circle* was distant stars. (**Galileo** 2,000 years later confirmed it.) He said that the best form of government is democracy.

Democritus was a materialist. He said that spiritual matters did not exist, that the soul and even thought was material. He is said to have written 70 books on math, ethics, history, music, etc. (“Books” then were typically as long as modern chapters.) Only fragments survive. **Democritus** wrote a set of rules for behavior; “Be moderate in all things, cultivate culture as the surest way to achieve the most desirable goal of life, cheerfulness.” He also said, “Truth lies in the depths.”

430 BC **Sophocles** **Quotes** **Drama:** **Sophocles** (c.496-406 BC), the second great Greek tragedian, added a third actor into the developing tragic drama, wrote *Oedipus*. Its message, humans are often trapped by forces greater than them. Said, “The gods plant reason in man, of all good gifts the highest.. Live well, die well. Wisdom outweighs any wealth. Numberless are the world’s wonders, but none more wonderful than Man.” Truth is always the strongest argument.” “When gods do ill, why should we worship them?”

Euripides **Quotes** **Drama:** **Euripides** (c.484-406 BC), third and last great Athenian tragedian. His gods were mortal, cruel, and selfish. He said, “Cleverness is not wisdom . . . Love is all we have. .Much effort, much prosperity Question everything, learn something. Answer nothing. Talk sense to a fool and he will call you foolish.. Slavery is not to speak one’s thought .. Whom the gods would destroy, they first make mad. No one who lives in error is free. No man on Earth is truly free. All are slaves of money. Public opinion or fear of prosecution forces everyone, against his conscience, to conform. Man’s greatest tyrants are his wife and children. Man’s best possession is a sympathetic wife. To the lowly, the powerful and rich are as gods_ He was a wise man who originated the idea of God.”

Hinduism **Code of Manu** **Male superiority:** In Hindustan, *Manu* created humans. *Code of Manu*, “In childhood a woman must obey her father, then her husband, when her husband is dead, her sons. A woman must never be free of subjugation. A wife must worship her husband as if he were a god, though he may be without virtue.”

Hippocrates (c.460-377 BC) Father of Medicine, denied divine causes of diseases, tolerated Greek gods.

Philosophy: **Diagoras**, a *Sophist* and wit, famous atheist of the 5th century BC, revealed the secret rituals of the Eleusian mystery religion, so made it ordinary. He burned a wooden image of a god to cook turnips, said that if it really was a god, it should save itself with a miracle. Disbelief in the gods was a crime. He was sentenced to death. He fled to Sparta.

Greece: Socrates Plato Epicurus Greek Theater Alexander Aristotle

c.420 BC Philosophy: Athens in the 5th century BC was open to ideas, with a middle class eager to learn.

Socrates **Socrates** (c.470-399 BC), came from a middle class Athenian family, served as an infantryman in the Peloponnesian wars, was first a sculptor like his father, then decided just to think and question. Before him, **Heraclitus** (ref. 504 BC) had shifted the focus of philosophy to the nature of change. Greek philosophers had focused on trying to understand the natural world. They disregarded the gods.

Ethics **Socrates** was a Sophist, but took no money for his teachings and questioned others, particularly *Sophists* and the elders of Athens. He shifted the concerns of philosophy to the study of humans and their behavior. **Socrates** and his student, **Plato**, ignored the material world and concentrated on abstract principles, raw thought, and the conduct of people. He also believed that there was another land on the opposite side of the Earth.

Socrates sought truths **Socrates** was the first to promote the notion of ethics / morality. Like the *Sophists*, he engaged in a relentless analysis of any and all subjects. While other *Sophists* sought to show that there was no absolute truth or absolute moral standards.

Socrates sought to find truths. To that end, he relentlessly sought precise definitions of ideas. Anything less than an absolute definition was *doxa*, mere opinion, not true knowledge, *episteme*. He sensibly said that the beginning of wisdom is the definition of terms.

Knowledge comes from doubting. To make correct choices, one must have correct knowledge. Knowledge was virtue, the supreme good. Ethical action follows from rational thought. "There is only one good, knowledge, and one evil, ignorance." [Note, not intelligence, but knowledge.] Knowledge came from doubting.

"There is only one good, knowledge, and only one evil, ignorance." The only true wisdom is knowing that you know nothing. (**Descartes** (1637) spoke similarly.)

Socrates challenged all conceptions of life as he knew it, even the idea of having a conception. Piety, materialism, and hunger for power distracted people from reality.

He questioned every belief, asked for its evidence. Contrary to the *Sophists'* self-centered rhetoric, he introduced dialectic (starting with an incontrovertible statement based on simple experience and building on it with clear and logical rules)

Reason and logic was crucial in the development of philosophy. This dominated philosophical thought for 2,000 years while the *scientific method* developed (i.e., procedures, like observation, measurement, experiment) to verify or falsify scientific hypotheses developed slowly.

The *Socratic Method* asks questions to reach a clear and consistent expression of assertions.

Follow the evidence **Socrates** thought that **Protagoras's** notion that *Man is the measure of all things* was vain and false. His basic rule, "Follow the evidence, wherever it leads . . . The unexamined life is not worth living." By knowledge, he meant "how-to" knowledge of the craftsman as well as the knowledge of a scholar. "The important thing is not to live but to live honorably." These sentiments were then revolutionary.

He just asked hard questions, claimed not to know anything. The pleasantness of an idea didn't make it true. He wanted people to learn to live peacefully together. His needs were simple, "How many things there are which I do not want." **Socrates** and **Plato** didn't accept the notion of atoms. (**Epicurus** 300 BC

Slavery is a system of outrage and robbery. Race Relations: Slavery was an accepted institution in Greece and in all known cultures, **Socrates** called it "a system of outrage and robbery." **Plato** said, "Slavery is a system of the most complete injustice." To overcome the relativism of the *Sophists* and **Heraclitus**, **Socrates** wanted to find some immovable foundation on which to build the edifice of knowledge.

Socrates He found his immovable foundation in humans and he called it the *psyche*, the soul. The

Quotes immovable point in this conception of the soul was, for **Socrates**, one's conscious awareness of what words mean. To know that some things contradict others, that justice does not allow harming others was an example of the type of knowledge one could attain just by using the powers of reason. That is, the existence of ethical principles is knowledge. To attain reliable knowledge, state an obvious proposition and examine, with dialectic conversation precisely what it means.

Socrates is not known to have written anything. What we know of him is from **Plato's** writings.

Logic areas **Socrates** said philosophy could be divided into five areas:

1. Logic, What is valid? What can be profitably argued and proven.
2. Ethics, Which actions are right and which ends are good?
3. Aesthetics, Beauty and art and taste and judgment.
4. Epistemology, The study of the nature and scope of knowledge. What do we really know, and how?
5. Metaphysics, The search for ultimate categories, to understand the ultimate scheme of things.

c. 420-399 BC **Political Theory**: **Socrates** and **Plato** disdained Athens's democracy. They believed that the best government was by philosopher kings. Those who were most capable should rule. But, until the kings became philosophers, he expediently accepted his *Royal Lie*, i.e., "Those who rule deserve to do so." He said people won't accept rulers unless they feel the rulers are superior, i.e., philosopher kings or gods. (**Protagoras** had said that all men possessed "political arts" so all men should participate in governing.) **Socrates** and **Plato** assumed humans were the most important beings in the world (but not atheists; kill them).

Greek Theater **Theater, comedy**: **Aristophanes**, instinctively conservative, introduced comedy, satire, to the Greeks. He wrote *The Acharnians* 425 BC, about the stupidity of war.
Satire is the weapon of skeptics. *The Knights* 424 BC, a violent political lampoon.
The Clouds 423 BC, a biting attack on the new intellectualism of the sophists.
The Wasps 422 BC, the abuses of the Athenian justice system and unequal distribution of wealth.
The Birds 414 BC, ridiculed the disastrous Greek expedition to Sicily. "Under every stone lurks a politician. The wise learn many things from their foes." It described man's dissatisfaction with his lot.
Lysistrata 411 BC, Women withhold sex to force men to make peace.
The Frogs 405 BC, satirized **Euripides**, poets, prophets, and priests.
Plutus 388 BC, on the poor quality of other playwrights.
Aristophanes gently satirized **Socrates**. (**Plato** blamed him in part for **Socrates's** trial.)

410 BC **History, Psychology**: **Thucydides** (c.460– c.400 BC), an Athenian historian and general, wrote *History of the Peloponnesian War* (Sparta vs. Athens). He is remembered for his impartiality and evidence gathering and analysis of cause and effect. The gods were irrelevant to his analyses. So, he has been called the father of political realism. He saw the political behavior of persons and what they caused as influenced by their fears and self interest. Students of war still study his work on international relations theory and **Pericles' Funeral Oration** became widely read. More generally, **Thucydides** understood human nature, explained behavior.

400 BC **Hinduism**: *The Bhagavad Gita*, a Hindu sacred poem, in Sanskrit, described a talk between Lord Krishna and Prince Arjuna. One's true self is one's undying soul which is divine in nature. The practice of detachment is possible through self-knowledge and devotion to God and is to be initiated in the performance of righteous acts that promote social order. When righteousness declines and lawlessness increases, God comes into this world in human form to restore order

400 BC **Hindu epic poem** Possible date of the final form of *Mahabharata*, a Hindu Sanskrit sacred epic poem to be read literally and figuratively, good vs. evil, described Heaven and Hell, probably dating to eighth century BC, with 100,000 couplets and long prose passages telling of "the great tale of the throne of *Hastinapurain* the *Bharata* dynasty." (It was ten times longer than the *Iliad* and *Odyssey* combined).

Rules of war Unlike the *Vedas* which must be letter perfect, *Mahabharata* evolved by its reciters in language and style. Some of its concepts later appear in the *Bible*. It was the first known discussion of the concept of

a “just war” and established criteria for such a war, like proportionality (chariots can’t attack cavalry, only other chariots), just means (i.e., no poisoned arrows) just cause, and fair treatment of prisoners.

399 BC **Socrates’s trial:** **Socrates** continually denigrated Athenian democracy and common men.

He so embarrassed Athens’s elders by his incessant questions that they tried him for impiety (not believing in Athens’s gods) and corrupting the young, trumped-up charges.

Euthyphro dilemma

Philosophy: Before his trial, **Socrates** asked **Euthyphro**, “Is there a universal concept of goodness? Is an act moral in and of itself [i.e., without God]? If so, God is just a conduit for moral knowledge, or because God commanded it?” [if so, morality is based on God’s whim.]

This dilemma undercuts the notion of revealed religion. Jewish philosophers say that this dilemma is misleading as it leaves out the option that God “acts only out of His nature.” This idea that morality depends on belief in a supernatural entity is the common claim of religions.

Trial of Socrates

At **Socrates’s trial**, the most famous trial until **Jesus’**, the prosecutors said that **Socrates** acted wickedly, and was criminally curious into things under the earth, and in making the worse cause appear the better. His “impiety” was simply disrespect for the gods of Athens.

There was no law against atheism. No overt statement of **Socrates** was alleged or mentioned at his trial. **Socrates** lectured the judges, “Are you not ashamed that you give your attention to acquiring as much money as possible, and similarly with reputation and honor, and give no attention or thought to truth and understanding and the perfection of your soul?”

399 BC Male citizen jurors chosen by lot voted to convict **Socrates** of the two charges and forced him to drink poison, hemlock. He said, “And now the time has come when we must depart. I to my death. You to go on living. But which of us is going to a better fate is unknown to all but God.” He died at 71.

Socrates’s trial was a sign of the decline of Athens. He was tried essentially for practicing free speech, a principle purportedly venerated in Athens. The oracle at Delphi said **Socrates** was the wisest man. **Socrates** said if that was so, it was because he knew his own ignorance.

Walter Lippmann

Socrates’s, Plato’s, and Aristotle’s philosophical conceptions of the divine and ethics had great influence in Medieval Christian and Muslim dogma, but had little effect on the masses of Greek people, who remained pagan. “The music is nothing if the audience is deaf.” **Walter Lippmann** (1937).

Cicero (65 BC) said **Socrates** “was the first to call philosophy from the heavens and to place it in cities, & even to introduce it into homes and compel one to inquire about life and standards & goods and evils.”

Michel de Montaigne (1580) said, “There is nothing more notable in **Socrates** than that he found time, when he was an old man, to learn music and dancing, and thought it time well spent.

390 BC Geo-botany: Chinese botanists noted that certain plants grew only in soil containing certain minerals.

China China was unknown to the Med peoples, so this was not known to the West until c1600. Chinese flew kites. Students of **Mozi**, Chinese (c.470-c.390 BC) made the earliest known attempt to describe *inertia*.

387 BC **Philosophy:** **Plato** (c.427-347 BC), from a wealthy family, on **Socrates’s** death, traveled, and 12 years later in 387 BC, returned to Athens, founded *the Academy* to research philosophy.

He wrote *Dialogues* about the imprisonment and death of **Socrates**, mainly quoting **Socrates**, and *Symposium* on the nature of love. He believed everyone wanted to be a flourishing human being, that philosophy was the way to achieve it, and that justice and virtue are in one.

Plato rejected the world of sense in favor of the self-created world of pure raw thought. Most of **Plato’s** writings related talks with **Socrates**. Their ideas were almost the same. **Plato** believed that a *demiurge*, a minor god, the personification of reason, had created order out of chaos. and thus made the Earth. He believed that God was good and not the cause of suffering.

Humans can do evil things that cause suffering, but that God is that persuasive element in the world that achieves goodness and harmony that is possible among free agents.

Geometry **Plato** did not admit anyone to his Academy who did not know geometry. **Charles Peirce** (1891)

387 BC explained, "Geometry suggested the idea of a demonstrative system of absolutely certain philosophical principles" from which further principles could be learned." **Peirce** was concerned with how we should come to believe something. **Descartes**, in his *Discourse on Method* said the same.

Plato's soul

Philosophy, the soul: **Plato** found the motive force in the universe in the soul, a concept mentioned by **Homer** but more prominently mentioned by **Pythagoras** and the *Orphic* mystery religion. Justice and virtue are about the inner state of one's soul. **Plato** said that after death pious persons' souls went to a beautiful place. This idea that people have "souls" became a basic concept for Christians. (Jews had no concept of a soul.) For **Plato**, the ultimate reality is not only ethical and rational, but also aesthetic. The Good, the True, & the Beautiful are effectively united in the supreme creative principle.

There's another world

Plato gave the first reasoned argument for the existence of another world. He found the concept of a soul satisfactory because of the relationship between the concepts of moving stars and movement on Earth.

He ruled out senses as a reliable source of knowledge, and focused on ideas, which exist in a world of their own. **Plato** opposed atheism as it enabled discord. His relative **Critias** wrote a play wherein religion was an invented lie to keep otherwise brutish humans law-abiding. This idea is common in history.

Allegory of the cave

How we think: **Plato's Republic** used an allegory of a cave to illustrate human knowledge.

Vygotsky: "We [can only] think in concepts and words we know."

"Imagine a cave with a wall down the middle. On one side of the wall are fires and people and animals. On the other side of the wall are people bound so that all they can see their whole lives are the shadows of the people and animals from the other side of the wall. If taken outside the cave, the prisoners would at first be uncomfortable but gradually realize that he had been seeing only shadows of real things in the cave." The goal of education was to take people out of their caves. This refuted the skepticism and relativism of the *Sophists*. Knowledge was possible.

Ideas / Forms are reality.

Plato developed an idealistic metaphysics which postulated an ultimate eternal and immutable reality of pure Ideas or essences. He said "forms" are primary while visible objects are their direct derivatives.

Forms are not conceptual abstractions but have a quality of being, a degree of reality superior to the concrete world. Objects in the world are concrete expressions of a more fundamental idea.

What we observe with the senses, is just appearance. When one says "red" or "good," is that something that exists separately, apart from red objects or good thoughts? There is a basic reality, but it is something we cannot see; true reality is an essential *Form* or *Idea* and it is permanent and unchanging.

Plato: Abstract concepts are the real reality

"Catness" is the essence of a cat. Beauty was a Form, which objects (or people) can sometimes attain. Ideas and forms are the true reality. This was called *realism* (confusing to moderns).

In contrast, *Nominalists* said that abstract concepts like "red" and "good" were mere "names" and that the only real things were real things. **Plato** said, "Knowledge is the food of the soul," and a woman is "a lesser man." And, "Those whose hearts are fixed on reality itself deserve the title of philosopher."

387 BC Universals like "good" and "catness" were his answer to **Thales's** question (Is anything permanent?). He felt true knowledge can be obtained only by understanding *Ideas* or *Forms*. As science, it's meaningless. (Believers like **Leibniz** and skeptics like **Huxley** and **Russell** later said the same.)

His theory of *Ideas* or *Forms* was his most significant philosophic contribution. It is forgotten now.

Claims need evidence

Plato started with statements he thought universally true, i.e., *deduction*, not *induction* (see **Aristotle** 335 BC). He denigrated **Democritus's** materialistic thinking, wanted to burn his books.

Said, "Philosophy is the acquisition of knowledge . . . for wonder is the feeling of a philosopher. Philosophy begins in wonder." He saw a God as the essence of the Good.

Reason. Intuition is better than sense knowledge

Reason was judgment based on good evidence. All claims must have valid bases. He said that knowledge through the senses was inferior to intuitive knowledge. **Plato** said the soul had three parts, a reasoning part that produced wisdom, a spirited energetic part that produced courage, and a desiring part, the virtue of which was temperance. For **Plato**, the meaning of life was to attain the highest form of knowledge, which is the *Idea* (or *Form*) of the Good. Humans have a duty to pursue the Good.

Using **Socrates's** dialectic, **Plato** looked into the natural world using abstract and theoretical

Experiments hinder progress	concepts, rather than Aristotle's later investigation and the derivation of a hypothesis to explain it. He and Socrates felt that experiment and observation (<i>empiricism</i>) were not only irrelevant but positively misleading in the search for knowledge. This slowed the progress of science for centuries. Plato's theory that perfect reality could only be discovered through contemplation or revelation readily became, through St. Paul, AD 45, a cornerstone of Christian thought.
	380 BC Political Theory: Plato grew up in Athens in a time of questioning about all human relationships. Athens was nominally a democracy. Sparta was a military dictatorship of warriors. Plato: <u>A tyrant is always stirring up some war or other in order that the people may require a leader.</u>
Plato's Republic; communal living	He was the first known political theorist. Political thought was incidental to his idealistic metaphysics. He wrote <i>The Republic</i>, the first book on political theory. It said that to participate in civic life was a citizen's highest aspiration. <u>The four political virtues are wisdom, temperance, courage, and justice.</u> <i>The Republic</i> is an ideal utopian and totalitarian dream of a city in which human life is arranged according to a stable conservative hierarchy, with separate social classes, guardians, soldiers, and workers.
Philosopher kings	Plato's republic was ruled absolutely by self electing philosopher rulers called <u>Guardians</u> who lived simply and communally, even with wives in common; (a shocking concept to upper class Athenians; children would not know their parents), with professional soldiers, lastly, the workers, artisans, farmers, entertainers, Marriages would be arranged so that the best breeders would come together and improve the genetic stock. <u>Children who were dumb or deformed would be killed;</u> a rigid soulless class society.
The Republic advocated an authoritarian state	<u>Each person would contribute what he does best,</u> not interfering with others' roles. Poets weren't allowed. Guardians could lie for the good of the state. Said, "Man will never see the end of trouble until true lovers of wisdom become rulers, or rulers become lovers of wisdom." To be a Guardian would be an economic step down, as they had no wealth. Plato's features like censorship, austerity, repression, and militarism are objectionable today. But Plato did not question the legitimacy of the non-philosopher rulers who then ruled Athens, a cop-out. (In 1932. Aldous Huxley took <i>The Republic's</i> ideas to their logical conclusion in <i>Brave New World</i>). Plato: "God is the author of not all but only a few things, for few are the good things in life, many are evil. Wilfully and completely recasting human conditions, as Plato advocated, was a new idea for Man. <u>Greek law was simply tradition, not a matter of legislation.</u>
Plato's types of government	Plato said, "Rule by a monarch restrained by law is the best form of government. Rule by a monarch <u>unrestrained by law</u> is tyranny, the worst form of government. Rule by a few <u>restrained by law</u>, an aristocracy, is the second best form of government. Rule by a few <u>unrestrained by law</u> is oligarchy, the second worst form of government." "An imbalance between rich and poor is the oldest and most fatal ailment of all republics. <u>The state is the soul writ large.</u>" A principal contribution was his idea of an aristocracy of intelligence."
Plato distrusted democracy	He believed that <u>a clever sophist orator could deceive the average man,</u> so the "truth" must be imposed. He said, "<u>Democracy passes into despotism.</u>" "<u>The price good men pay for indifference to public affairs is to be ruled by evil men.</u>" In <i>The Republic</i>, Plato said that the Idea of the Good is the child or offspring of the Good, the deal or perfect nature of goodness, and so an absolute measure of justice. <u>He separated reality and appearance, knowledge and opinion.</u> Only the soul was real and immortal. Augustine later used this concept.
Motion is imparted motion	Philosophy: For the creation of the world, Plato posited a <i>Cosmological Argument</i> with a "demiurge" of supreme wisdom and intelligence who created the Cosmos. Motion was "imparted motion" that required some kind of self-originated motion to set it in motion and maintain that motion, i.e., no inert
Great chain of Being	He also said that there was a <i>Great Chain of Being</i> with God at the top, then Man, then animals to plants. This was the usual way of seeing the universe for 2,400 years. It put everything in its place. The universe is rational. Like educated Greeks, Plato said Earth was round. He also believed in a lost island, Atlantis.

c. 375 BC **Political Theory:** He said that impiety should be punished by five years in prison, death for a second offence. This is obscenely harsh by modern standards, (and unconstitutional in the US) but not by the standards of ancient cultures or Islam. Remember, life was cheap. Also, "In politics we presume that everyone who knows how to get votes knows how to administer a city or a state. When we are ill we do not ask for the handsomest physician, or the most eloquent one." His second great idea was equality of opportunity. He said women could be trained as warriors like men.

Harsh

Plato and Socrates asked the great questions. Plato and others could not reconcile religion & reason

Philosophy: **Plato** and **Socrates** considered almost all the great questions that philosophers later addressed. **Plato** brought philosophy to its maturity.

His comprehensive treatment of knowledge was so powerful that his philosophy became, through Neo-Platonism the most influential strand in the history of Western thought.

Plato brought together all the major concerns of human thought into a coherent organization of knowledge. He and then **Aristotle** (335 BC) then gave people the freedom to think, the legacy that a science of nature was possible. He mistakenly believed the stars had intelligences and had, like humans, immortal souls. **Plato** (and c.425 BC, **Augustine, Aquinas, Kant, Descartes, and Spinoza**) sought inconclusively to reconcile religious beliefs with reason.

375 BC **Astronomy:** **Eudoxus's** *Phaenomena*, described numerous star constellations. It was widely read.

370 BC **Political Theory, Callicles:** an Athenian political philosopher, taught *real politik*, "Weaker folk make laws to restrain the strong, but nature's true justice is that the stronger rule."

Theme: Life without God would be meaningless

350 BC **Hebrew Bible, Ecclesiastes; or the Preacher (Greek for Koheleth):** written sometime between 450 and 200 BC is the shining jewel of the Hebrew Bible. It is reasonable, hopeful, said good people suffer and the world is cruel. Koheleth doubted every aspect of religion, from the idea of righteousness to the idea of divine justice. "All is vanity." 1:2. "The race is not to the swift, nor the battle to the strong, neither yet bread to the wise, nor yet riches to the learned, nor yet favor to the skillful, but time and chance happeneth to them all." 9:11.

It is optimistic, "To everything there is a season.. A time to be born, and a time to die, a time to plant" 3:1-2. "Rejoice and do good." 3:12. "Eat, drink, and be merry." 8:15. "Live joyfully with the wife whom thou loveth all the days of thy life of thy vanity." 9:9.

Koheleth doesn't argue with God. The only way to real peace is to accept that there is no real justice. *Ecclesiastes* also mentions an afterlife. "The same fate awaits the righteous and the wicked, the good and the bad, the pure and the impure, those who sacrifice and those who don't." 9:2.

350 BC **Heraclides** of Heraclea, pupil of **Plato**, said the Earth rotated, suggested Venus and Mercury orbit the Sun.

348 BC **Philosophy: Demosthenes** (c.385-322 BC) Athenian, We believe whatever we want to believe."

340 BC **Philosophy: Diogenes** (412-323 BC), exemplar of the Cynic school of philosophy (almost the opposite of its current meaning), held that happiness consisted in the satisfaction of one's basic needs and decried the pursuit of wealth. I am a citizen of the world. Love of money is the mother of all evils.

Cynics

He sought virtue and moral freedom in liberation from desire, only mastery of one's self. Cynics disdained democracy, ignored the idea of gods, rejected all of civilization's comforts and customs.

Diogenes did not want (or have) anything so he did not lack anything. One story is that one day he was eating bread and lentils for supper. **Aristippus**, who lived comfortably by flattering the king, said to him, "If you would learn to be subservient to the king you would not have to live on lentils." **Diogenes** replied, "Learn to live on lentils and you will not have to be subservient to the king."

China **Philosophy: Mang-tsze / Mencius** (371-289 BC) slightly altered Confucianism, argued that the ultimate justification of rulership was the welfare of the people. Every person is born good.

If man retains his original nature, he will remain good. In man's original nature, there is a sense of shame, a sense of courtesy, and a sense of right and wrong. If one relies only on one's sense perceptions without subjecting them to the control of his mind, one falls into evil ways and perverts his original nature. One who practices harmony and righteousness with sincerity

radiates the spiritual influence of the universe. "One who is benevolent will not be rich."

335-323 BC	Natural Philosophy, Aristotle : (384-322 BC), the founder of life sciences, a Macedonian doctor's son, and Plato 's pupil for <u>20</u> years. On Plato 's death in 347 BC, he traveled, founded several schools.
Aristotle	He tutored Philip of Macedon's son Alexander for three years; then, 12 years later, in 335 BC he opened his <i>Lyceum</i> in Athens devoted to natural philosophy, i.e., science. Plato 's Academy had ignored science. <u>He taught for just 12 years.</u> Aristotle came at the end of Greece's creative period, and it was 2,000 years before the world produced any scientist near his equal.
Best scientist for 2000 years	He published <i>Physica</i> which provided a systematic way to study the natural world (even though he put the Earth at the center of the heavens). His studies and <u>writings covered almost all the then known natural philosophies.</u> <u>They constitute one of the most amazing achievements ever credited to a single mind.</u> He made the study of natural things respectable.
Thinking, Nature, Politics	We describe his thinking in three general areas, Thinking, Nature, and Politics.
How we must think.	How we must think: Aristotle posited three basic laws of thought, whose aim is clear thinking. These laws are fundamental axiomatic rules enabling rational discourse. They are valid today.
Basic laws of thought	1. the law of identity A is A, Plato is Plato. This <i>assumes</i> but does not <i>prove</i> that A exists. 2. the law of contradiction. B can't be both B and not B. Contradictory statements can't both be true. 3. the law of the excluded middle A is either B or not B, <u>A proposition is true or not true.</u> Leibniz (1710), Kant (1751), and Schopenhauer (1819) proposed changes to these laws of thought, but these three laws have remained valid.
	Aristotle said, "To be educated is to know enough to distinguish between sense and nonsense in all areas of knowledge, not to know everything. Truth lives in the world around us. Contrary to Plato , Aristotle believed that <u>knowledge comes only from the senses, from experience, empiricism, observation.</u> (Feynman (1949) agreed, "Experiment is the sole judge of scientific truth."
The world is rational	<u>Epistemology</u> : Aristotle established different methods and different criteria of knowledge for different subjects. His many books were taken around the Med. by Greek travelers. And the idea grew that there was only one truth, not numerous truths, about something, plus the idea of a relationship between knower and the thing known. For him, the world was rational and humans could understand it.
Dielectric	Both Plato and Aristotle 's arguments used opposites in argument (dialectic) and the self-evident nature of geometric forms. In <i>Metaphysics</i> , Aristotle said that true knowledge is the knowledge of ultimate causes. <i>Forms</i> or <i>universals</i> , exist only in things.
Metaphysics	Said, "Define the words you use. " <i>Metaphysics</i> " was originally merely a chapter <i>following</i> the chapter on physics but came to be known as the science of things transcending what is physical or natural. <i>Metaphysics</i> is thus that branch of speculation dealing with first principles of things, including such concepts as being, time, space, cause, substance, essence, and identity.
Systematic Logic	<u>Thinking about a situation</u> and coming to a conclusion about it is instinctual, the most unconscious, natural, and elementary of mental processes. In any given situation, one amasses in one's mind, consciously and unconsciously, all what one remembers and what one knows or believes (false or true) about the situation and comes to a conclusion (or not). He then decides what to say, a different matter. Aristotle analyzed man's natural thought process and formalized it into Systematic Logic, <u>his most influential achievement</u> , the discipline of dealing with the principles of valid inferences. Logic is the systematic building of ideas from other ideas. Scientific knowledge comes from syllogisms, (premises, statements of fact with a common term, to produce conclusions.) Logic is a process.
335-323 BC	<u>Syllogisms</u> : A syllogism is a mode of reasoning where two or more supporting statements with a common term support a conclusion. Aristotle divided Systematic Logic into <i>Deductive</i> and <i>Inductive</i> syllogisms. Supporting statements/premises for syllogisms may be <i>explicit</i> /
2 or more premises support a conclusion	expressed <u>or implicit</u> from the context of the syllogism.
Deduction	Premises may be universally true or simply a statement hopefully but not necessarily true. <u>Deductive syllogism's premises are presumed to be universally true.</u> (Maybe they are, and thus

reach a *presumably* universally true conclusion. For example, first premise All persons are mortal; second premise, **Socrates** is a person; Conclusion, **Socrates** is mortal. In *Nicomachean Ethics* 6, he wrote, "To be acceptable as scientific knowledge, a truth must be a deduction from other truths." He favored *deduction* as he wanted certainty. *Deductive* syllogisms are used in geometry.

Inductive syllogisms: One or more of the premises of *Induction's* syllogism's are hopefully true but not necessarily universally true. **Aristotle** described *Induction* as "an argument from particulars to the universal." He much preferred *deduction* as he wanted certainty.

335-323 BC **An inductive syllogism** The more accurate an *inductive* syllogism's premises, the more valid the conclusion.
Example: First Premise - All trees I have seen in Wyoming are pines. (Presumably true.)
Second Premise- I have seen a lot of Wyoming.
Conclusion- All trees in Wyoming are pines. (This is an *inference*, not a *deduction*)

Does valid mean true or accurate? This conclusion is *valid*, as the conclusion is *consistent with* the premises, but *not necessarily true* as both premises are weak. *Inductive* syllogisms can have many premises (to raise the probability of the conclusion being *true/accurate*). The probability that a conclusion of an *inductive* syllogism is *true* can be near certainty and may even be 100% true. *Deductive* syllogisms need only 2 true premises.

Organon, Logic **Aristotle's** works on logic: *Organon* developed and refined the study of logic to show how one could establish the validity of a line of thought.
Conclusions are based on evidence Induction and deduction are merely explanations of the natural act of thinking, i.e., we reach a conclusion based on all available evidence (premises), what one thinks one knows or believes.
Like **Moliere's** *Would-Be Gentleman* who discovered that for 40 years he had been speaking in prose, persons now learned that they had been thinking in induction and deduction.

Aristotle said that humans could reason about the world. If one doesn't immediately reach a decision/conclusion by intuition, he can reason, i.e., applying logic. People mostly come to a conclusion immediately by using a heuristic, a rule of thumb, an aphorism. See **Daniel Kahneman** and **Amos Tversky**, 1973, '75, '78, '80, 2011, p. 400).

Induction worked better **Aristotle** (& **David Hume**, 1739) distrusted Induction, but *induction* came to be more useful to science. Virtually all thinking is induction, inferential, and by analogy. People act on what they think they know and believe, *not* on universally true statements as such statements are rare.

Science, Nature Away from Athens, he did most of the scientific thinking he is known for. He discarded **Plato's** abstractions in favor of observing and analysis of the physical world. "Physics" comes from *physis*, Greek for nature. He said, matter is the potentiality, the capacity to be something; matter is unlimited which is able to be limited by form; when matter is limited by form, there is actuality.

Aristotle: Teleology / purpose: Aristotle incorrectly believed that purpose was the basic mover in nature.
All things, Man, dogs, rocks, plants, have a purpose. He said that all actions of plants and animals had a *goal / telos / purpose* toward perfection. "Nature makes nothing without some end in view, nothing without *purpose*; and it must be that nature has made all things specifically for the sake of Man."
Democritus: no purpose Plants and animals grow to fulfill themselves. That is, an acorn has an inner goal to become an oak tree. "It is in the nature of a stone to move downward, and it cannot be trained to move upward even though one throws it in the air 10,000 times." **Democritus** had said, there's no *purpose* in nature.

Aristotle said philosophy is the science of the universal essence of that which is actual.

He and **Plato** both regarded philosophy as concerned with the universal.

Where **Plato's** universal was in abstract ideas, **Aristotle's** universal was in things. **Aristotle** favored the "golden mean," moderation in all things. He described a mechanical universe.

Categories of science **Aristotle** divided *natural philosophy/science* into three categories:
1. the theoretical physics, mathematics, metaphysics, for disinterested knowledge,
2. the practical Ethics and politics, for the guidance of conduct, and
3. the productive/poetical for guidance concerning the arts.

Matter plus form is reality	For Aristotle , matter and form were the two essential components of reality. Matter remains even if it assumes new forms. A substance is both form and matter. Matter does not exist by itself, nor does form. He also said, "We understand the forms of things, and forms can be in our minds, whereas things themselves cannot be in our minds, i.e., "the knower is one with the thing known." <u>Real things are real things and there's nothing else.</u> Matter is pure potentiality; form is what matter becomes when it becomes anything. (Example, <u>marble is matter; the statue carved from it is form</u>).
Four causes in science 335-323 BC	Aristotle's <i>Metaphysics</i> named four <i>causes</i> in science: 1. Material cause, what something is made of, wood. 2. Formal cause, tells what a thing is, a chair. 3. Efficient cause, that which initiates change, carpenter, plans. 4. Final cause, the purpose of the object place to sit Now there was a new curriculum for all male citizens to learn, i.e., natural philosophy / science. The spirit of inquiry exploded as the seafaring Greeks exported it. Greek was the language of the educated Mid-East. Aristotle said, "<u>True knowledge is the knowledge of ultimate causes.</u>" Physics: Aristotle distinguished between <u>essential</u> and <u>accidental</u> properties of things. <u>Essential properties determine what a thing is, i.e., an apple;</u> <u>Accidental properties determine how a thing is, such as big or small or green or red.</u>
Aristotle's accomplishments	Nature: <u>As an observant scientist, Aristotle</u> described the birth of bees in a hive, he investigated the pairing of insects, the courtship and mating habits of birds, the behavior of drones in a beehive, a cuttlefish that attaches itself to a rock in a storm. He saw that blood carried nourishment in the body. He classified 500 species of animals into eight classes. <u>He founded anatomy (from Greek-to cut up), embryology, and physiology.</u> He described the internal anatomy of shellfish, fish, and squid. He correctly said sound doesn't travel through a vacuum. Until Plato and Aristotle, Greeks had principally studied Homer's epics for such knowledge.
Science, Nature	To the question, "<u>Why do cats have kittens?</u>" Aristotle said, "There's a <i>Formal Principle</i> which passes from the parent to the child." This is useless, like Plato's "catness." It doesn't answer what the formal principle is. But it was accepted for centuries.
Aristotle's political theory Man's highest goal? To think	Politics: Aristotle said philosophy was <i>reason</i>. In ethics, he said virtue is a mean between extremes (The Greeks' famous golden mean), and <u>Man's highest goal should be using his intellect.</u> Aristotle's fundamental ideas were much like Plato's; said, "The basis of a democratic state is liberty." And they both disdained democracy as democracy arose from people thinking that if they are equal in any respect, they are equal in all respects. <u>But Aristotle added an empirical, inductive method, which marked the beginning of political science away from ethical and philosophical musings about the state.</u> Where Plato saw the state as originating from the of division of labor, Aristotle saw the state as organically evolving from the household. For Aristotle the meaning of life, the <i>telos</i> / goal was achieving <i>eudaemonia</i> (happiness or well-being or flourishing). He said, "All men, by nature, desire to understand, desire knowledge . . . The good life involves friendship with virtuous men and development of the intellectual virtues."
Men are smarter	"The state is by nature prior to the family. . . since the whole is prior to the part." A husband rules his family as a monarch rules his subjects, due to his superior intelligence. The goal of the state is to produce cultured men. <u>Like Plato, he said that a virtuous king is the best form of government.</u>"
335-323 BC Metaphysics changed its meaning. "Poverty is the parent of revolution"	Aristotle criticized Plato's cold <i>Republic</i> for ignoring the complexity of society, the pleasure of family, ownership, of participating in ruling. <i>Metaphysics</i> meant just the section after physics. Where Plato developed a world in which the physical sciences had little if any real reason to exist, Aristotle created a world where sciences were developed largely by observation of nature, but also based on speculation on what ought to be. Said, "<u>Poverty is the parent of revolution and crime.</u>" Both he and Plato taught that the highest occupation of humans was the discovery of nature's laws.

Aristotle: Inequality of wealth causes revolutions “Inequality (of wealth) is the source of all revolutions: no compensation can make up for inequality.” He said that under unequal economic conditions, the poor would view the system as a conspiracy against them and would see no reason to follow the rules.

The second consequence of inequality is that the rich tend to feel they were better than their fellow citizens and see themselves above the law (a common opinion, even today).

Political theories Aristotle said, “We must regard every citizen as belonging to the state.” A common belief then. (Contrast Kant in 1755 and Epicurus and others, “Every Man is an end in himself.”)

Aristotle said, “A democracy is a government in the hands of men of low birth.” “The mass of people are slavish in their tastes, preferring a life suitable to beasts.” But also, “The only stable state is the one in which all persons are equal before the law, a democratic state.”

Aristotle, like many rulers, was practical and cynical,

Long before Machiavelli (1532), Aristotle cynically advised how smart rulers rule. He said for a tyrant to retain power, he should kill any rival of merit, prohibit common meals, literary assemblies, and potentially dangerous education. He should employ spies, keep people busy with war or great works, and fake piety. (See 1532) Aristotle criticized the communism of Plato’s ideal state.

Aristotle perceived that the ultimate political problem was to strike a balance between liberty and authority. He said that there are two theories regarding claims to power, the rights of property and the welfare of the greatest number, i.e., the “epic struggle between liberty and the common good.”

Man is by nature a political animal Political Theory: Aristotle said the best government provides an active and “happy” life for its people. He named six forms of government: Monarchy, Aristocracy, and Polity as ‘good’ forms of government, and Tyranny, Oligarchy, and Democracy as ‘bad’ forms. He said, “Man is by nature a political animal,” meaning only persons could make communal living possible. He distinguished between kings who ruled by inheritance and tyrants who ruled without the consent of the governed. He believed the city-state with separation of powers was the ideal form of political organization.

Equity must be part of any legal system Race Relations: Slavery was necessary and just as workers were incapable of governing. Greeks were superior to others; education was important (for males); law should govern, not individuals. Good consists of people achieving a state suitable to their nature. His great contribution to law was to say *epieikeia* / equity / fairness had to be a part of any legal system. Said, “There are two parts of good government; obedience to laws, and the goodness of the laws.”

Aristotle said there is a *Scale of Being* with minerals at the bottom and humans at the top, similar to Plato’s *chain of being*.

Aristotle’s God Theology: Aristotle posited his main argument for God, a *Cosmological / Prime Mover Argument* in *Physics* (VIII, 4-6) and *Metaphysics* (XII 1-6). He said that there is an underlying eternal world with no beginning and no end; so his *Prime Mover* did not create the essence of the world, but organized it, and all change traced back to such Prime Mover who set the world in motion.

335-323 BC **Cosmological arguments for God** Theologians seek to show the existence of a god or God through faith or revelation. There are three versions of the cosmological argument, 1. the *Prime Mover (Aristotle)*, 2. the *First Cause Argument*, and 3. the *Necessary Being Argument (Aquinas (1273))*. One version of the *Cosmological Argument* posits that the ongoing nature of the universe is itself so extraordinary that it infers that there must be a God.

Natural theology arguments *Cosmological Arguments* are part of classical natural theology, the attempt to show the existence of a god / God through reason and nature alone. Most arguments of *natural theology* begin with a natural phenomenon, a fact that purportedly requires an explanation, but no *natural* explanation is known. Thus one infers a *supernatural* explanation, a god or God did it. *Natural theology* arguments can make an argument for a god but don’t overcome the problems and contradictions relating to the Christian/Muslim God (see 1988 where Pope John Paul 2 abandoned rational/ scientific arguments for God and pp. 404-407-Recap of arguments for God).

God by Default *Cosmological arguments* posit a mystery, a god/God, to explain a mystery, the origin of the world / universe. They are “*God by Default*,” or “*God by Inference*” arguments, or “arguments from

ignorance.” That is, “We can’t explain the origin of the world with our current knowledge, so we *infer* that a supernatural force (to believers, their particular God) must have done it.

Common Sense *Cosmological arguments* appeal to one’s common sense and common experience, namely, phenomena have *causes*. (**Einstein’s** relativity and quantum theory are now universally accepted but make mincemeat of *common sense*.) **Al-Ghazali** 1085, **Aquinas** 1273, **Leibniz** 1710, and **Plantinga** 1977, all later proposed *cosmological arguments* for God..

Earth is a sphere Astronomy: Like **Plato**, **Aristotle** said the Earth was a sphere. In Egypt he had seen stars that “were not seen in northerly regions,” which could only occur if the Earth was a sphere.
Philosophy: He conceived the concept of the *golden mean* (the desirable middle between two extremes). Said, “The aim of art is to represent not the outward appearance of things, but their inward significance.”

Aristotle’s scientific errors **Aristotle** dominated Western science for 2,000 years. He was brilliant, but made some errors. His most significant error was 1. Events have purposes. Objects fell and water ran downhill seeking their natural place. *Purpose* was the prime mover in nature. It infected other errors. He also incorrectly believed:
2. Matter is made up of four earthly elements, water, earth, fire, and air, and a heavenly element, aether, and they are mutually transmutable. He didn’t accept **Leucippus’s atomic theory**, and, due to the respect for **Aristotle**, *atomic theory* was ignored for around 2,000 years. (**Feynman**, a 20th century genius, said atomism is the single most important scientific idea.)

3. The brain cools the blood and is unrelated to thinking.
4. Men have more teeth than women.
5. Air is weightless.
6. The speed of light is infinite. (It’s close).
7. Light travels faster than sound as seeing was more noble than hearing. Only the *reason* is wrong.
8. Heavy objects fall faster than light objects. Many scientists through history showed this wrong.
9. Falling objects accelerate as they are happier nearing their natural resting place.
10. Earth is the center of the universe. All matter, the Moon, Sun, and planets orbit Earth on crystalline spheres. Most accepted this, **Plutarch** said all planets have some force governing their movement.
11. Sheatfish suffer from sunstroke as they swim so close to the surface.
12. Earthquakes are air escaping from underground pockets.
13. Fossils could reproduce like plants and animals.
14. The world began with a *Prime Mover / First Cause*. This was not refuted until the 18th century.
15. Objects moving horizontally was violent motion and required a force to move them. Specifically, Objects move horizontally even though there is no other object physically pushing it, and, as “Nature abhors a vacuum” the empty space behind a moving object fills with air which pushes the object. **Da Vinci** (surprisingly) and **Galileo** both later bought this.
16. Cats have kittens as there’s a *Formal Principle* which passes from the parent to the kitten.
17. All species of animals and plants do not change, i.e., are immutable. No evolution.
18. Black Sub-Saharan Africans in the “Torrid Zone” had dark skin as they were burnt by the Sun.

Aristotle’s Purpose in nature supported Christian theory Despite these errors, **Aristotle’s** accomplishments were the greatest advance in thinking and knowledge for two millennia. As noted, his most important error was that all natural phenomena, such as a plant growing, itself has a *purpose* to grow. But natural events simply follow natural laws like the laws of physics or chemistry or biology or botany. His idea of purpose for natural events was later used by the Christian Church as it supported the Christian claim of a supernatural power over natural events. **Thomas Kuhn** (1962) said that **Aristotle’s** view of *purpose* caused many of **Aristotle’s** other errors.

Errors regarding human affairs Regarding human affairs, Aristotle mistakenly believed:
19. Slaves had no intelligence. They deserve to be slaves as they allowed themselves to be enslaved, i.e., natural slaves, a *Fallacy of the Consequent* (circular reasoning, which, applied to **Socrates’s Royal Lie**, i.e., that rulers are justified as they are rulers (also circular reasoning). This makes the *Royal Lie* a theory of injustice.
20. Negroes are indolent as they came from hot climates.
21. Non-Greeks are slaves by nature. They are more willing to submit to a despotic government. Natural slaves should be hunted down like wild beasts to bring them to the correct way of life.
22. Females are “the imperfect result of nature, trying to make the most perfect being, (i.e., male)

- They suffered from a kind of inadequacy. Females developed as they were cooler *in utero*.
23. The male is superior, the female is inferior; the male is ruler, the female is subject.
 24. "Heat" or the masculine principle was the key to anatomical development.
 25. Foreigners were inferior as they did not speak Greek. (*A Fallacy of the Consequent*, see p. 443)

Importance of Aristotle **Aristotle's** errors were mostly errors of fact, lack of knowledge, not errors of reasoning. In the 20th century he would not have had such beliefs. His male superiority and "natural slaves" helped justify slavery and the subjugation of women for c2,000 years. The *Old & New Testaments* and the *Qur'an* had the same beliefs about women & slaves. 50 of 150 books of **Aristotle's** lectures have survived.

Aristotle's best success was to rethink the questions raised by Plato and to develop a metaphysical system as original and as well thought out as **Plato's**. He rejected **Plato's** theory of *Forms*.

With **Aristotle**, there is a mature discipline with two carefully worked out but competing points of view. He said, "Fear influences man more than reverence." (**Machiavelli** said the same, see 1532)

Aristotle's time marked the beginnings of a moral and intellectual process, an appeal to righteousness and to the truth from the passions and confusions and immediate appearances of existence.

334-323 BC **Alexander of Macedon** (355-323 BC), **Aristotle's** former pupil until age 16, inherited Macedon (Northern Greece including Salonika). He then conquered Greece, ending the Greek *Classical Age*, and starting its *Hellenistic Age*. He then conquered Asia Minor and Egypt, founded Alexandria, Egypt. (**Alexander** named 20 towns after himself.)

Alexander the Great

While conquering the known Western world, **Alexander** sent **Aristotle** reports and zoological and botanical samples, and had numerous collectors of natural objects to serve him. With this help, **Aristotle** established a museum of natural objects. He examined and classified over 500 species of animals and described their anatomies. His student **Theophrastus** did the same for plants. Thus, public knowledge now came into being. **Plato** never would have established a museum of *things*.

Alexander killed many **Alexander** burned Persepolis, Persia's capital, defeated Samarkand / Maracanda. He killed Greeks, Pisidians, Cappadocians, Medes, Thracians, Illyrians, Hindus, Egyptians, the Thebian Sacred Band, Uxians, Paphlagonians, Galatians, Armenians, Mesopotamians, Persians, Bactrians, Sogdians, and Arachosias; so he was called Alexander the Great. Temples were dedicated to him.

He died in 323 BC in Babylon at 32 after defeating the three largest Western empires. Egypt, Persia, and Hindustan. **Alexander** spread Greek culture. It mixed with Greek, Persian, and Egyptian law and customs.

Doubt was widespread Critique: William James: "Alexander's career was piracy pure and simple, nothing but an orgy of power and plunder, made romantic by the character of the hero. There was no rational purpose in it."

The period from **Alexander's** death until **Cleopatra's** death in Egypt in 31BC is considered the *Hellenistic Age*. Doubt was so widespread its philosophers were the original Cynics and skeptics.

323 BC As Alexander was Aristotle's patron / protector, when he died, **Aristotle** was condemned as godless. He left Athens and died within a year at 62. He had taught at his *Lyceum* just 12 years.

Egypt After Alexander died, his generals fought one another. One, **Ptolemy Soter/Savior**, who had been appointed satrap of Egypt, took complete control of it. One theory is that **Ptolemy Soter 1**, founded the city of Alexandria and named it Alexandria to solidify his ties with the dead conqueror.

Over 300 years until 30 BC, there were 15 **Ptolemys**, Macedonian Greeks, who ruled Egypt as pharaohs often with their sister / wives, several named **Cleopatra**.

Skeptics Philosophy: Pyrrho (365-c275 BC), an ex-soldier of **Alexander**, taught extreme *skepticism*, that knowledge was impossible and that the search for knowledge caused angst, so don't have any beliefs, which of course is easy for most people. His philosophical skepticism is the most extreme school of *skepticism*. In its most extreme form, philosophical skepticism says not only can we not know anything, couldn't know that we couldn't know anything. **Metrodorus of Chios** said, "We know nothing, not even whether we know or do not know, or what it is to know."

300 BC The Mauryan empire, the first Hindustani empire, under Emperor **Ashoka /Asoka** (264 to 227 B.C.), reached its zenith. It adopted *Buddhism* and started Hindustan's golden age. **Ashoka** respect for the dignity of all men, and above all, religious tolerance and non-violence. Said, "It is forbidden to decry other sects. The true believer gives honor to whatever in them is worthy of honor."

H G Wells said **Ashoka** was one of the great monarchs of history, "whose dominions extended from Afghanistan to Madras . . . "is the only military monarch on record who abandoned warfare after victory." He had invaded Kalinga, a country along the east coast of Madras. The expedition was successful, but he was disgusted by what he saw of the cruelties and horrors of war.

He declared, in certain inscriptions that still exist, that he would no longer seek conquest by war, but by religion, and he then devoted his life to spreading Buddhism throughout his world.

He ruled his vast empire in peace and with great ability. He was not religious.

For 28 years **Asoka** worked sanely for the good of his subjects. Among the thousands of known rulers, **Ashoka** stands out."More living people cherish his memory today than have ever heard of **Constantine** or **Charlemagne**." His grandson, **Ashoka** the Great, expanded Buddhism.

Hindu Brahmins eventually ousted Buddhism from Hindustan as it discredited their authority.

Philosophy: Four schools of philosophy flourished in Athens; **Plato's Academy**, called peripatetic, (as he walked around as he taught), **Aristotle's Lyceum**, *The Garden* (below (**Epicurus** founded it in 306 BC), and *four*, *Stoic* (founded by **Zeno** around c.300 BC).

306 BC **Epicurus** (341-270 BC), from Samos, a student of **Democritus**, a *materialist* and *atomist*, set up his school called *The Garden*. It accepted women (other schools didn't). He taught that pleasure/happiness / tranquility (avoidance of pain) is the supreme good, achieved through a life of simplicity, ease, and moral rectitude, not sexual lust, drink, or revelry. Barley bread and water was their preferred food.

His Four Truths **Epicurus** taught four fundamental truths: 1. There are no divine beings that can threaten us. 2. There is no afterlife. 3. What we actually need is easy to obtain. 4. What makes us suffer is easy to endure.

He paid no attention to political affairs. Said, no pleasure is in itself bad, and all pleasures are alike in quality. Death is nothing to fear, for while we live, death is not with us, and when we are dead, we don't exist and therefore cannot feel pain. Death is nothing to us.

Epicurus believed that death ends both the body and the soul. Likewise, he taught that the gods, if they do exist, have no involvement in human affairs, so there was no reason to fear them. But, he maintained that people should still behave ethically. Despite saying that belief in the gods was foolish, he urged doing the rituals to live a trouble free life.

Greek Individualism. Important in Western political theory **Epicurus** and his contemporary **Zeno** of Citium began the birth of *Greek Individualism*, one of the three great turning points in Western Political Theory. Rather than seeing people as a part of the polis, they taught that people were individuals, self-sufficient, with an inner life, moral qualities, character, able to discover truth for himself.

Epicureans believed that the universe was a machine where humans had no special status, and that superstitions / religion and the dread of death caused the greatest fear. The other chief obstacle to happiness was fear of pain. Life's goal is to live in agreement with nature.

300 BC **Epicurus** said, accurately, that organs develop from exercise, weaken from unuse. Also, knowledge comes from sensations. He said the greatest good is prudence, more precious than philosophy; that sight was caused by light *entering* the eye. This was ignored until **al-Haytham** c1300 years later.

Zeno the Stoic Philosophy: **Zeno the Stoic** of Citium (c.335-263 BC), set up his school in Athens and taught that as one couldn't change much in life, happiness consists of conforming one's will to divine reason, to accept one's place in the world. **Plutarch** described Stoicism, "We should consider all men to be one community and one order common to all." This was less demanding and more influential than *Epicureanism*.

Stoicism Stoics' most important political and philosophical contribution were their ideas of universal law and

**universal
law and
universal
reason**

universal reason and their concept of the brotherhood of Man. Reason, their god, was the means to happiness. Nature is Virtue. Stoicism was a cold philosophy, an ethic of indifference. Stoics viewed the entire universe as a manifestation of God, and happiness is surrendering the self to the divine order of the cosmos, living in harmony of nature. They argued that a slave is a human being with dignity and rights and ought to be regarded as a friend and fellow servant.

Stoicism prepared the way for Christianity, contrary to the Greek emphasis on Man's relation to the polis. For Greek pagans, everything had a purpose related to Man. Some animals one eats; others provide wool. Cruelty affords people the opportunity to exercise virtue.

The mixing of barbarians and the eclipse of the city-state after **Alexander** died facilitated these ideas. To live in tune with nature is to live in accordance with virtue.

Durant Will Durant: Stoicism and Epicureanism were the apathetic acceptance of defeat, the effort to forget defeat in the arms of pleasure, theories as to how one might yet be happy though subjugated or enslaved.

300 BC **Science, Library of Alexandria:** The Greek respect for science was exemplified by the Library at Alexandria and especially **Archimedes**. **Ptolemy 1 Soter**, the Macedonian Greek ruler of Alexandria, founded and supported a museum (temple of the muses) in effect the first university, with c500,000 scrolls, the birthplace of science. Jews were welcome. Like the Assyrian kings in Nineveh, all scrolls/tablets in Egypt and all scrolls brought into Egypt were hand-copied for the Library. In two generations, Alexandria outshone Athens in intellect. It became the intellectual capital of the Western world.

**Scholars at
the Library,
Euclid,
Apollonius,
Aristarchus,
Hero,
Archimedes,
Hipparchus,
& Pingala**

The Library's scholars included **Euclid** (300 BC, geometry, below), **Eratosthenes** (240 BC), **Herophilus** (who studied the brain's functions, dissected them, discovered nerves, described the optic nerve, and founded a medical school), **Apollonius** of Perga (mathematician), **Aristarchus** (astronomer, 270 BC, who said the Earth orbited the Sun), **Archimedes** (see 220 BC), **Tomocharis** (who compiled a list of stars), **Hero**, who designed a primitive and useless steam engine (see AD 500), **Hipparchus** of Nicaea (190 -120 BC), a Greek astronomer, geographer and mathematician. He is considered the founder of trigonometry, but is most famous for his incidental discovery of the precession of the equinoxes, and **Pingala**, (1202.) a Hindustani mathematician, the author of the *Chanda śāstra*, the earliest treatise on Sanskrit prosody (the study of the elements of speech), it contains the first Indian use of zero as a digit (indicated by a dot) and]the creator of **Pingala's** formula for generating metrical patterns. He also used the term śūnya (zero) and studied the **Fibonacci** numbers (mātrāmeru).

c. 300 BC **Ptolemy** also established a temple, called the *Serapeum*, which had a trinity of three gods, Serapis, Isis (the Moon cow goddess), and Horus (the child god), all in one god. with the idea of immortality predominant (like the Christian trinity). Alexandria became the largest Jewish city and intellectual center. Face-to-face or hand-written letters were the only way scholars communicated. Later, under Rome, Alexandria also became the greatest trading center in the West (i.e., lands centered around the Med.)

**Euclid's
Elements of
Geometry**

Mathematics, Geometry: The *Pythagorean Theorem* became well known at Alexandria around 300 BC, **Euclid** did not discover or found geometry, but he did compile *Elements of Geometry*, used into the late 20th century, the most translated and copied Western book except for the *Bible*.

Elements of Geometry was the most influential book in the history of mathematics. It presented geometry as an axiomatic system. **Euclid** started with 23 definitions, five common notions, and 5 self-evident (presumably true) axioms (namely 1. A straight line may be drawn between any two points. 2. Any terminated straight line may be extended indefinitely. 3. A circle may be drawn with any given point as center and any given radius. 4. All right angles are equal. 5. For any given point not on a given line, there is exactly one line through the point that does not meet the given line.). He then *discovered* 467 theorems, all derived from the basic axioms.

**Euclid's
5 axioms**

Elements proved the infinitude of prime numbers and presented the Euclidean algorithm. (**Apollonius** of Perga soon discovered 20 more.) He also wrote on perspective, conic sections, spherical geometry, number theory, and mathematical rigor.

Euclid said that the Earth was a sphere as a sphere is the most harmonious geometric form

- c. 270 BC **Helio-centrism** Astronomy: **Aristarchus** (310-230 BC), born in Samos, at the Alexandria library, suggested that the Earth rotated and orbited the Sun which was 300 times bigger than Earth. It was called blasphemous as it was contrary to **Aristotle** and ignored until **Copernicus**. (16 centuries later)
- c. 265 BC Rome ruled all Italy. Several million persons were under direct Roman control. Romans developed the arch (semicircular until the pointed Muslim and Gothic arches); used it in bridges, aqueducts, and buildings. (The Pantheon had a span of 164 ft.).
Romans enslaved conquered people and could kill them but found that making them citizens worked better (see *Force, Fraud, Favors* at 1532). Rome began the barbaric gladiator games.
- 250-210 BC **China united, reforms** China: **Shih Huang Ti** / The first emperor, united China by defeating the warlords, and imposed reforms; built a network of roads and canals, unified the laws, standardized the written language, the coinage, weights and measures, and axle widths. He began the building of the Great Wall (1,500 miles), and with hundreds of thousands of soldiers guarding it to keep Mongol horses out. Mongols fought on horseback. Mongol soldiers could easily scale the wall, but horses couldn't.)
Importantly, he abolished feudalism, introduced bureaucratic government (but not on *Confucian* principles) He controlled the economy, and believed that most knowledge is dangerous.
- He had all books but those on law, herbal medicine, and farming burnt.
Chinese used seed drills and iron plows. China was then the largest state.
China's centralized nation state pre-dated Europe nation states by over 1,000 years.
- Yin and Yang** China prospered. The two basic scientific ideas in China were: 1. that there are five elements, water, metal, wood, fire, and earth, and 2. there are two fundamental forces, *Yin* (clouds, rain, female, inside, cool, dark) and *Yang* (heat, warmth, sunshine, male).
In 240 BC, Chinese reported the comet later named **Halley's** comet. (Comets, shooting stars, and eclipses have through the ages been considered signs from a supernatural power.)
There was virtually no contact between China and the West, separated by vast empty steppes.
Chinese developed a magnetic compass c. 200 BC (but used it only for divination until the 11th century when they used it to navigate). They also developed a horse collar where the horse's chest, not its throat, pushed its harness. It was not used in the West for c650 years.
- Eratosthenes deduced the Earth was a sphere** Science: **Eratosthenes** (276-194 BC), from Cyrene (Lybia), Greek, became director of the Alexandria library. He compiled a chronology of events dating from the establishment of Troy to c250 BC, calculated the circumference of the Earth (and thus the radius) very accurately by noting that the Sun was directly overhead at Syene /Aswan, but 5,000 stadia (500 miles) north in Alexandria, at precisely the same time, it was angled 7.2 degrees from the vertical.
He realized this could only be if the Earth were a sphere. (Mesopotamians had believed this.) He calculated the Earth's circumference at 25,000 miles, very close. (Later, Greeks incorrectly calculated the circumference at 18,000 miles, which became widely accepted and was used by **Columbus**.)
He also mapped the Nile and drew a map of the known world with lines of latitude and longitude.
- c. 220 BC **Archimedes** Physics: **Archimedes** (c287-212 BC), born in Syracuse, Sicily, an Athenian colony. At the Alexandria Library, he was a hydrologist and mathematician. He said one can calculate the relative density of an irregular shaped object by submerging it in water and comparing its weight to the water it displaced (Used to determine its purity). Similarly, a floating object weighs the same as the fluid it displaces. (now called the **Archimedian Principle**).
He discovered the simple mathematical law of the principle of a lever. (Force multiplies by the ratio between the lengths of the two arms.) He is credited with saying, "Give me a lever long enough, and a firm place to stand on and I can move the Earth." He invented the compound pulley.
He calculated π (pi) at 3.1418 (very very close) by using 96 polygons. π is 3.14159+).
- Mathematical Formulas** He discovered the formulas for the surface area and volume of a sphere. Namely:
Volume of a sphere = π times $1\frac{1}{3}$ times the radius cubed, or $\frac{2}{3}$ of a cylinder same diameter & height.
Surface of a sphere = π times the radius squared or 4π times the surface of a circle the same diameter.

Volume of a square pyramid or a cone = 1/3 the area of the base times its height.

He wrote about the water screw then used in irrigation to raise water. So it was named after him. Greeks used water mills to grind grain as of the third century BC. Romans did so two centuries later.

200 BC Greece declined: The power of Greece declined and Rome rose.

Cato the Censor (234-149 BC), a Roman official, opposed Greek culture as weak and immoral and tried to maintain Roman customs. He was cruel and carried on a lifelong war against everything gracious, or pleasant. **Cato** disliked women asserting even minimal rights.

Romans had gladiatorial shows (killing as a sport).

Romans were more practical than Greeks and adapted Greek culture to their needs.

Keystones of Rome: Political Theory: The keystones of the Roman Republic's success were law, citizenship, and roads.

Law, Roads, Citizenship Whereas Greeks were concerned about abstract standards of justice, Romans wrote their 12 Tables of laws, used in Rome until Rome fell c.AD 410; and in the Eastern Roman empire (Constantinople) until 1453, when it fell to the Muslim Seljuk Turks. The Greeks didn't have a common law. Romans fiercely respected their laws. The 12 Tables were posted every place Rome conquered. Romans made their conquered peoples citizens, the Greeks foolishly never did.

Roman roads were so well built some are still used. Water was brought to Rome from the mountains by an aqueduct. Rome had one million persons. Romans had one important belief that the Greeks did not, that a small idea that works is better than a grand idea that does not. People from Spain to Persia all wanted to be Roman citizens.

168 BC Judaism: Antiochus 4, ruler of Syria, severely persecuted Jews, who revolted and won Jerusalem.

Rabbis told Jews that Yahweh would eventually vindicate his suffering people, and punish their Gentile oppressors, and usher in a new supernatural order resurrecting the dead into the Kingdom of God. The idea of an afterlife grew for Jews after 168 BC, sparked by the prophet **Isaiah**.

164 BC Astronomy: Like the Chinese did in 240 BC, Babylonians saw the comet later named after **Halley**.

Problem of Evil 155 BC Philosophy, Carneades: (214 -129 BC) was the head of **Plato's Academy**. Athens sent him to Rome on a diplomatic mission. There he spoke eloquently of the virtues of Roman justice and the next day eloquently refuted all his previous arguments. He spoke so brilliantly that **Cato**, a Roman official, had the Roman Senate send him home lest the youth of Rome learn of the infirmities of Roman law.

Carneades, a moderate Skeptic, said that if there were a criterion of truth it must come from reason, the senses, or conception. But reason depends on conception which depends on the senses, and as we have no way to validate our sensations, there's no way to know what's true. But we have to act so we can act on probabilities. He thus replaced the Skeptic's *know-nothing* with a more sophisticated theory of probability. He simply wanted proof before accepting an idea.

God isn't self-evident, so needs proof He said, "The existence of God is not self-evident, and therefore needs proof." He said that simple *belief* in a God did not *prove* that a God existed, just that someone had such *belief*. **He disputed the Design Argument by naming errors in the world's design, like diseases, earthquakes.** He asked if reason was God's greatest gift to Man, why did God distribute it so unevenly?

Carneades' iteration of the Problem of Evil **Bertrand Russell's** (1872-1970) *History of Western Philosophy* quoted **Carneades**, "Those who say positively that God exists cannot avoid falling into an impiety. For, if they say that God controls everything, they make him the author of evil things; if, on the other hand, they say He controls some things only, or that He controls nothing, they are compelled to make God grudging or impotent, and to do that is quite obviously an impiety."

Rome ascended, Greece faded Cicero Lucretius Caesar Jesus Paul

c.150 BC- AD 150 **Roman Republic / Empire was at its peak.** Overview. 150 BC to AD 150 was the high point of classical civilization. It was the highest point that Westerners attained until 1492. The Roman Republic became an empire in 3 BC, and grew to include most of what Romans knew as the world from mid-Scotland to the Caspian and Persian Gulf, and from Romania to the Sahara. Romans built 50,000 miles of roads plus bridges and aqueducts.

The ten mile Segovia aqueduct, built c.AD 100, spans a valley half a mile wide. It is, at its tallest, 93 feet, with hundreds of arches, laid with no lime or cement. It still stands.

The Roman Republic did not include Asia or the Americas.

Edward Gibbon (1737-94), seen as the greatest English historian and an MP, said that the apex of Roman and world history was from the ascension of **Trajan** (AD 98) to the death of **Marcus Aurelius** (AD 180). Then Rome slowly declined and fell in the 400s.

Astronomy: **Seleucus** of Seleucia: "The Earth rotates and orbits the Sun; tides are governed by the Moon."

150 BC **An afterlife** For Jews, God's omniscience was illustrated by prophecies he made, *Isaiah* 39:5-7, 44:28-45, *Jeremiah* 25:11, *Zech.* 11:12-13. Persians had the concept that at some future time, God would resurrect the dead and the wicked would be punished and the righteous rewarded. (A common religious concept, useful for rulers).
For Jews, the concept of divine punishment after death developed only in the 2nd century BC.
Paul, as a Jew, used the Jewish concept of Hell in his proselytizing for **Jesus** (AD 34-64)

146 BC Rome absorbed the remnants of Greece, adopted its culture. Greece became part of the Roman sphere.

Technology: Greeks had seen the arch, but used it only for sewers. And, as seafarers, never appreciated the importance of roads. Most Greek philosophers believed in astrology.

Why was Greece important for us? Greece: Sir Peter Hall, "Greece is important today as Athens was first in many things that have mattered to Western civilization; democracy, albeit imperfect, philosophy, including political philosophy so well formed it was not added to for 1,000 years, the first systematic written history.

Four historians explain It systematized science and medical knowledge and based them on generalizations from empirical observation. Greece gave us first sophisticated lyrical poetry, then tragedies and comedies and naturalistic art. It single-handedly invented the principles and norms of architecture."
H D F Kitto (1897-1982), Brit., said, "Greece had a new conception what man's mind was for."

Greeks saw the world can be known without any god's help **Peter Watson** (1943-) Brit, "The Greeks were the first to truly understand that the world could be known, that knowledge could be acquired by systematic observation without aid from the gods, that there is order in the world and universe that goes beyond the myths of our ancestors. And there is a difference between nature that follows natural laws and the affairs of men which have no such order but where order could be imposed or agreed."

The Greek Way **Edith Hamilton** (1867-1963), American, Greek scholar, *The Greek Way*, said, "Greek civilization at its peak represented a "flowering of the mind" that has yet to be equaled in the history of the world."
The Greek Way showed that the Greeks recognized and appreciated such things as love, athletic games, love of knowledge, fine arts, and intelligent conversation . . . The fundamental fact about the Greek was that he had to use his mind. The ancient priests had said, "This far and no farther. We set the limits on thought." The Greeks said, "All things are to be examined and called into question."

Greek reason was limited What limited Greek thinking? Greeks believed: 1. the city as the best political unit, 2. that slavery was legitimate. And 3. Greeks had little to no knowledge of the world beyond the Med. 4. They had inadequate tools to measure which are essential to studying the natural world, no clocks for short time intervals, no telescope, microscope, accurate scales, or efficient numerical notation.

146 BC **The world** History after the Greek era is very largely the history of the three ideas: 1. Science, 2. Universal

- can be understood** righteousness, and 3. Of a human commonwealth spreading out from the minds of the rare and exceptional persons where they originated. People always faced the greatest political problem, i.e., how to live in peace and promote freedom. The Greeks usually chose freedom (at the cost of constant conflict), both with other Greeks and with others. Much of the natural philosophy / science that the Greeks believed was factually wrong. But their belief that the natural world could be understood by logic and reason was supremely important for the advance of knowledge.
- Romans' cardinal virtues** Romans' cardinal virtues were wisdom, courage, moderation, and justice. By 89 BC, all free inhabitants in Italy were "citizens" of Rome. Romans never considered treating other states as sovereign states. The Roman father had absolute power over his family and his slaves. Romans were indifferent to science and geography beyond their state. They made no attempt to learn about Hindustan, **Gautama, Zoroaster**, Persia, China, Huns, or Africans. There were many schools in the empire, but little intellectual progress.
- c. 136 BC **China, a sophisticated culture** China: The **Han** Empire was as large and rich as the Roman Republic and developed a culture more sophisticated than the Romans. Emperor **Wu-ti** made *Confucianism* China's official philosophy. All sons were co-heirs of their father. China's Imperial University was founded c.124 BC. Between 100 BC and AD 200, the Chinese made a seed-planting machine, rotary winnowing machine, rotary fan, and wheelbarrow.
- Han Ying** noted snowflakes were six sided, unnoticed in the West until 1611. Astronomer **Liu Xin** (46 BC-AD 23) calculated pi at 355/113 (as had the Pythagoreans). Limited trade of luxury goods between China and the West started in the 3rd century BC by caravans through central Asia, protected by the **Han** emperor, with buying and selling goods at caravanserais along the way. Westerners did not visit China..
- c.129 BC Astronomy: **Hipparchus**, at the Alexandria Library, made the first systematic catalog of 850 stars; calculated the length of a year and lunar cycle, and the distance to the Moon. He said that the Earth was closest to the Sun on Jan. 4, furthest on Quintilis/July 4. He developed a scale of sizes for stars showing their brightness; and adopted the Babylonian 360 degree circle to Western math.
- c. 65 BC **Cicero: gods were man's ideas, not super powers** Philosophy: **Marcus Tullius Cicero** (106-43 BC), Consul, leading lawyer of Rome, prolific author, philosopher, doubted the existence of supernatural powers. Like **Carneades**, he said, "I may ask for a rational explanation of religious faith . . . The immortal gods seem to have been fabricated for man's use." His *On the Nature of the Gods* said, "So various and so contradictory are the opinions of the most learned men on [the nature of gods] as to [acknowledge that] philosophy is the child of ignorance." This is *The Problem of Contrariety*, one of the problems with arguments for God, p. 406-407)
- Nature is the power that creates everything** **Cicero** said, "First, it is improbable that a god made the substance of which all things were created. [The world] has and always had a force and nature of its own. That which we call Nature is therefore the power which permeates and preserves everything." But, he thought religion for the masses was necessary to control them. Said, "Let the welfare of the people be the ultimate law. " The techniques of the successful politician, the methods of modern advertising—the whole panoply of persuasion is to be found in **Cicero**." (**Thomas Cahill**)
- c. 65 BC **To live is to think** Political Theory: **Cicero** sought to resolve the conflict between peace and freedom by establishing a government of laws, not of men. Like the Greeks, the early Romans chose freedom (over peace). A series of ruthless men offered to be tyrant / dictator to secure peace, including **Gaius Julius**, later to become Caesar / dictator. **Cicero** didn't convince enough Romans to save the Republic, but he was the first person to see that a belief in a constitution will ensure peace and freedom. His 800 still existing letters provide the most important source of current knowledge of life in Rome. Said, "To live is to think. A house without books is like a body without a soul."
- Cicero Quotes: Reason rules all** **Cicero** applied the principles of Greek ethical thought to the rough life of a Roman merchant and politician. He denied the possibility of certain knowledge. He introduced **Aristotle** and other Greek philosophers' writings to Romans. Said, "Reason is the ruler and queen of all things." Re slavery, "By the grand laws of Nature, all men are born free and equal and this law is universally binding upon all men."
- Cicero on philosophy** Philosophy: "Oh, philosophy, life's guide! Oh, searcher-out of virtue and expeller of vices! What could we and every age of men have been without you? You have produced cities; called men scattered about into the social enjoyment of life . . . Let the punishment match the offence." (More **Cicero** at 45 BC)
- 63 BC Rome under Pompey conquered Judea (Israel, Lebanon), home of the Jews. It became part of the Roman province of Syria.

c.60 BC Greatest classical statement of atheism	Atheism: Titus Carus Lucretius (c.96 - c.55 BC), Roman, Epicurean, wrote <i>De rerum natura</i> /On the Nature of Things, a long poem in six books, the greatest classical statement of <i>atheism</i> . It combined <i>stoicism</i> and <i>Epicureanism</i> . It explained Epicurus's (300 BC) philosophy of atomism and physics, but it also discussed sex, religion, magnetism and ethics. Said, "The vain crowds, wandering blindly, led by lies." Cicero praised it, " Lucretius's poetry is "full of inspired brilliance, but also of great artistry."
Epicurus withstood religion	Lucretius praised Epicurus , "When man's life lay foully prostrate on Earth crushed down under the weight of religion which showed its head from the quarters of heaven with hideous aspect lowering upon mortals, a man of Greece ventured first to lift his mortal eyes to its face and first to withstand it to its face. Him neither story of gods nor thunderbolts or heaven with threatening roar could quell." Little is known of Lucretius other than <i>De rerum natura</i> .
Atomism Evolution	<i>De rerum natura</i> portrayed Epicurus to Romans as the great champion of rational thought. Virgil (79-19 BC) summarized the poem's four main themes. 1. universal causal explanation 2. making people less afraid of the world 3. vindication of <i>free will</i> as opposed to determinism (i.e., all events, even throwing a ball, are inevitable as determined by previous events), and 4. denial of a soul existing after death. He said a soul is made of atoms and so dies when one dies.
58 BC Free Will	Note on Free Will: The mention of " <i>free will</i> " just above is the first of around 250 mentions of the phrase in this history. The concept is linked to concepts of moral responsibility, praise, guilt, sin, arguments for God, and other judgements which apply to actions that are freely chosen, which is the key question. It is also connected with the concepts of advice, persuasion, deliberation, and prohibition, as well as arguments regarding God's existence. Traditionally (and reasonably), only actions that are freely willed (as opposed to "determined") are seen as deserving credit or blame. <u>The literature on free will is as extensive as any subject in theology, philosophy, ethics, psychology, or law. A complete treatment of free will would overwhelm this book. Wikipedia's discussion is 50 pages. Do people have free will? Learned opinions vary dramatically. See pp.196-198) The will defense is the most common current argument cited against The Problem of Evil, a major issue in theology.</u> We discuss the <i>Problem of Evil</i> and the <i>free will defense</i> as they arise in history.
<i>De rerum natura</i> Another early idea of evolution	Philosophy: Lucretius's 60 BC De rerum natura , a book length poem, argued that nothing is ever generated from nothing; nature consists of nothing but atoms moving in a void. (Leucippus and Democritus had expressed this atomic theory centuries before, around 430 BC.) Lucretius said materials were made by combinations of atoms of various shapes, sizes, and weights. <i>De rerum natura</i> envisaged pre-technological peoples who lived "like wild beasts roaming at large. He depicted nature as a landscape of plants and animals transforming and progressing from primitive to more advanced stages across the ages, including man's rise from savagery to civilization, an early depiction of cultural evolution.
The universe runs on physical principles, not on the pagan gods. Religions were cruel.	<i>De rerum natura</i> described the nature of the mind and soul; explanations of sensation and thought; the development of the world and its phenomena; and explained celestial and terrestrial phenomena. Its universe ran on physical principles, not on the intervention of Greek or Roman pagan gods. It referred to the cultural and technological development of man, his use of materials, tools and weapons. It said the earliest weapons were hands, nails and teeth, then stones, branches and fire, that the universe had no creator but was a collection of random events. <u>Religions were cruel, superstitious, fueled by ignorance and fear. People should appreciate this life as there is no afterlife.</u>
<i>De rerum natura</i> Tetra-pharakon: Epicurus's 4 rules for happy living	To make it relevant and understandable to the people, the poem expressed forgiving yourself for being human; it's better to love than to hate, to live fully, even if imperfectly. (like <i>Ecclesiastes</i>). People's souls are composed of atoms, thus die when one dies, the soul dies.. The issue of <i>free will</i> versus determinism was important in Epicurean thinking. Lucretius described the metaphysical basis for the Epicurean <i>tetrapharmakon</i> (four rules to live a happy life): 1. Don't fear death, 2. What is good is easy to get. 3. What is difficult is easy to survive, and 4. Don't fear the gods. The body and soul are material and mortal
Survival of the fittest. Evolution. Natural selection	<i>De rerum natura</i> asserted that nature experimented endlessly across the eons, and those organisms (i.e., individual animals, plants) that adapted best to their environment survived best. (Darwin called this <i>Natural Selection</i> .) Living organisms survived because of their strength, speed, armor, thick skin, size, horns / tusks / antlers or intellect. He did not, however believe that new species evolved from existing ones or that modern land animals derived from marine ancestors.

The world is mortal	Lucretius said, that the world is not eternal but mortal. He introduced what could be the earliest (Western) version of a social contract theory according to which people decided to live together in societies based on a contract. The poem did challenge the contention that humans are necessarily superior to animals, noting that mammalian mothers in the wild recognize and nurture their offspring as do human mothers. <i>De rerum natura</i> could easily have been written in the 19th century, except for its error regarding Darwin's explanation of how new species emerge. As Epicurean philosophy contradicted Aristotle, <i>De rerum natura</i> was forgotten by scholars until serendipitously discovered by Poggio Brocciolini, a Vatican official, in 1417. (See 1417) <u>Mathematics</u>: Hindustan developed the first positional notation base-10 numeral system.
c. 50 BC	<u>Political Theory, Victors rule</u>: Gaius Julius (100- 44 BC), Roman consul and general, conquered France / Gaul (<i>Veni, Vidi, Vici / I came, I saw, I conquered</i>), likely killing 1 M and enslaving a million, in 55 BC tried to conquer England. It failed. He invaded England again in 54 BC, but left shortly to quell a revolt in Gaul.
49 BC Gaius Julius became Julius Caesar (means dictator)	Gaius Julius and his legions returned to Italy. Pompey told him not to enter Rome. Julius crossed the Rubicon River, burned the bridges behind him an act of war against Rome and conquered Rome. He sold the prisoners he had captured as slaves and became wealthy. He became Julius Caesar / dictator. He commissioned the "Julian" calendar of 365.25 days. Julius named the month of Quintilis after himself. The calendar had been designed by astronomer Sosigenes of Alexandria. (It was changed only in 1582, when it was out of sync with the seasons by ten days). Julius had a liaison with Cleopatra 7, queen/pharaoh of Egypt (She was the last of several Cleopatras.).
45 BC Cicero stated the Problem of Evil similar to Carneades	Cicero's de Natura Deorum / On The Nature of the Gods, <u>stated The Problem of Evil</u> similarly to how Carneades had expressed it in 150 BC. Cicero said, "Either God <u>wishes to remove evils</u> and cannot or he can do so and is unwilling, or he has neither the will nor the power or he has both the will and the power. If he has the will but not the power, he is a weakling, and this is not characteristic of God. If he has the power but not the will, he is grudging, and this is a trait equally foreign to God. If he has neither the will nor the power, he is grudging and weak, and therefore not divine. If he has both the will and the power (and this is the sole circumstance appropriate to God), <u>what is the source of evils, or why does God not dispel them?</u> (P G Walsh translation.) Despite this, Cicero accepted that a God existed. He used an analogy, "A field, though fertile, cannot yield a harvest without cultivation, no more can the mind without learning; thus each is feeble without the other. <u>But philosophy is the cultivation of the soul</u>. It draws out vices by the root, prepares the mind to receive seed, and commits to it, and sows in it what, when grown, may bear the most abundant fruit."
44 BC	Julius threatened the power of senators like Brutus, Casca, Cimber, and others. So they killed him in the Senate. With Julius gone, Cleopatra 7 returned to Egypt, killed her brother /co-pharaoh, and attached herself to Marc Anthony. The Roman Republic weakened and in 3 BC became an empire.
Ethics Cicero's last book	Philosophy, Ethics: Cicero's last book, <i>On Duties</i>, dealt with common problems, how to treat inferiors, how honest must one be, when to protest? Answer, "Where is there dignity unless there is honesty?" Always do the right thing, what's legal, open, honest, fair. Keep your word; a wrong action can never be really advantageous as it's wrong. [a modest profound directive, simpler than Plato or Aristotle].
On Duties: "Superstition is a senseless fear of God." "How like to us is that filthy breast the ape."	<u>On Duties</u>: "The distinguishing property of man's is to search for and to follow after truth. And we recently discovered, if it was not known before, that no amount of power can withstand the hatred of the many." "The death of this tyrant (Julius), whose yoke the state endured under the constraint of armed force and whom it still obeys more humbly than ever, though he is dead, illustrates the deadly effects of popular hatred; and the same lesson is taught by the similar fate of all other despots, of whom practically no one has ever escaped such a death. For fear is but a poor safeguard of lasting power; while affection, on the other hand, may be trusted to keep it safe forever." "<u>Superstition is a senseless fear of God.</u>" "All wicked men are slaves." "Extreme justice is extreme injustice." "How like to us is that filthy breast, the ape."
Cicero quotes	"<u>Beware of ambition for wealth</u>; for there is nothing so characteristic of narrowness and <u>smallness of soul</u> as the love of riches; and there is nothing more honorable or noble than indifference to money." "Morals today are corrupted by our worship of riches..<u>Reason is the mistress and queen of all things.</u>"
Stoicism became the dominant	Cicero also wrote that sure knowledge was impossible. Greek stoicism became the dominant philosophy among educated (i.e., rich) Romans. Cicero, Lucretius, Pliny the Elder (AD 23-79),

philosophy for Romans. **Marcus Aurelius, Sextus Empiricus, Valleius, and Lucian of Samasota** (AD 120–190) were among those who doubted the divinity of the Roman gods. **Pliny** wrote *Natural History* which became a mainstay of map makers for centuries. It was largely fanciful and incorrect.

43 BC **Augustus / Octavian** (63 BC-AD 14), and **Anthony** then had **Cicero** killed and nailed his severed hands to the Senate rostrum as **Cicero** had exposed **Anthony's** attacks on Romans' freedoms. **Cicero** was the last great champion of the Roman Republic. **Augustus** became caesar.

31 BC **Augustus** defeated **Anthony** and **Cleopatra** in a sea battle at Actium. Egypt became a Roman province. He became emperor in 27 BC. He shared control with the Senate consuls and tribunes. The empire stretched from Belgium to Syria. His *Augustinian Age* promoted farming and the arts, was Rome's golden age with Greek art, architecture, and literature. Romans developed the truss bridge, but neglected science. Evil, mad, and/or corrupt emperors followed **Augustus**. Despite their emperors, Romans built a state, roads, a system of law, and schools (for free males) throughout the empire.

25 BC **Virgil/Publius Vergilius** Maro (ref. 58 BC), Rome's greatest poet, wrote *The Aeneid* as a national epic. It told of Aeneas's wandering after Troy's fall, ended up in Rome. As **Homer's** epics did for the Greeks, *The Aeneid* taught Romans about their past. *The Aeneid* has been described as the Romans' *Bible* and Shakespeare all in one. It became the most influential work Rome gave to posterity.

c AD 1 **Tech-nology** China progressed more advanced and apart from the West. They studied endocrinology, used the belt drive and wheelbarrow before AD 1. They developed porcelain, adjustable calipers, the pendulum, and a water-powered bellows to work cast iron; said the solar year was 365.25 days, the lunar month 29.5 days. Trade with the West was tiny, but Chinese silk when first seen in Rome, became popular.

AD 8 **Publius Ovidius Naso / Ovid** (43 BC-AD 17), prolific and famous Roman poet, best known for his *Art of Love*, cynically said, "As it is convenient that there be gods, let us believe there are."

AD 1-30 **Rome governed Palestine** **Jews** **Jesus** Judea: Rome had conquered Judea in 63 BC. Judea had several Jewish sects, some chiefly spiritual (like the Essenes), many that hoped for a military Messiah to free them from Roman rule. Several Jewish sects worshiped a god who had died and was resurrected, like Osiris. There were at least a dozen secretive Jewish sects, usually worshiping an entity sired by a god with a human virgin mother. Jews spoke Aramaic, close to Hebrew. It had no vowels. Some also spoke Greek. AD 1 is the reputed birth year of **Jesus** in Bethlehem. Ancient Aramaic would have been written Ysh b'n yvsvf. **Jesus** grew up and became a Jewish teacher/preacher/rabbi who walked around Judea.

AD 30 **Jesus' reported death** **Paul** wrote that Jews had **Jesus** killed. *Thess. 2:14-15, Acts 3:14-15, 5:30, and 7:51-52*. The *Gospels of Matthew, Mark, and Luke*, written AD 65-90, decades after **Jesus's** reputed death, state that around AD 30, the *Sanhedrin*, the Jewish judicial of elders, arrested **Jesus** and convicted him of blasphemy (sacrilegious talk about God or sacred things) when he would not deny being the son of God. According to the *Bible*, The elders then demanded **Pontius Pilate**, the new Roman governor of Judea, kill **Jesus** for claiming to be king of the Jews.

Pilate demurred, but according to *Luke 23:21* the Jews cried, "Crucify him, Crucify him." **Pilate** then crucified **Jesus**. *Mark 15:15-25, Matthew 27:11-23, John 19:7,12, 14-15*.

Did Jesus exist? **The evidence is sparse.** In later centuries, **Jesus's** actual physical existence was doubted, the *Christ Myth Theory*. Biblical scholars have concluded that there is one generally-accepted non-Biblical reference about **Jesus** among several histories of the first century, namely one by **Flavius Josephus** (AD 37-c100), a Roman historian and a Jew. **Josephus** did not mention "**Jesus**" in his AD 73 book, *The Jewish War*. But, in his *Antiquities of the Jews* (written around AD 93-94), he mentioned "**James**, the brother of **Jesus**, who was called Christus." ("Christus" means "the anointed one.").

The next non-Christian reference to **Jesus** is by historian **Tacitus** (c AD 56-c117), a Roman senator, who in his *Histories* written c. AD 109, mentioned a "Christus" once, but didn't mention **Jesus** or his reputed miracles or teachings.

While significant for Christians, authoritative knowledge of the period is uncertain. Neither **Josephus** nor any of the other several historians at the time, whose accounts have survived, mentioned **Jesus**. (Another reputed **Josephus** reference to **Jesus** isn't considered authentic.)

That said, most biblical scholars accept that a man named **Jesus** from Nazareth /**Yeshua ben Yosef**, (**Jesus** son of **Joseph**) born c.1 BC, was one of several charismatic, itinerant rabbis walking around Judea at the time. The relevant issue with **Jesus** is not whether he ever actually existed but what the concept of **Jesus** as God has meant in history. As we know, the idea of

Jesus as God became the most widely known concept in the history of the Western world.

**Was Jesus
God?
Christians
say yes**

Based on textual study of writings of the period (which study begun just a few centuries ago), what, if anything, **Jesus** actually said (that is, what the *Bible* says he said) is uncertain. The life of **Jesus** and the concept of **Jesus's** divinity comes solely from the *the New Testament*, written several decades after he reputedly died. Of **Jesus's** divinity, scholars differ. *Matt.5:13* and *Luke 14:13* say that **Jesus** told his followers to spread his teachings. They did so, becoming "apostles" (he who is sent out).

**Jesus',
resurrection**

The *Gospel of Matthew 28:1-8* says that after **Jesus's** crucifixion, a rich man, **Joseph** of Arimathea, buried **Jesus** in a tomb he had dug. Two days later **Jesus** was gone from the tomb, and an angel told **Mary Magdalene** and followers of **Jesus** that **Jesus** was risen from the tomb and was then in Galilee.

Matt. 28:9-20 and *Luke 24* say a few persons saw **Jesus** in Galilee. *Corinthians 15:6* says over 500 people saw the resurrected **Jesus**." *Mark 16:19* says that after 40 days, **Jesus** ascended bodily into Heaven. **Jesus** and the apostles never considered that they were starting a new religion.

**The New
Testament**

Christian writings after the death of **Jesus**: The first Christian "Scriptures" were purported writings of **Paul** / **Saul of Tarsus**, a Roman and Jewish Pharisee rabbi. The writings attributed to **Paul** were likely written shortly after **Jesus's** death and while **Paul** was walking around Asia Minor c. AD 34- 64 proselytizing for **Jesus**. The *Gospels'* details of **Jesus's** life were written after **Paul** died, that is, probably around AD 65-95.

AD 36-64

**Paul's
Epistles**

The *Gospels* were written in Greek although the named authors were Aramaic. They were placed first in the Christian scriptures that came to be called the *New Testament*. **Paul's** epistles were the first written scriptures regarding **Jesus** so they are the first described herein.

Acts 9:3-9 states that **Paul** became a follower of **Jesus** and a believer in **Jesus's** divinity around AD 33-36 when he had a vision of the risen **Jesus** while walking near Damascus.

Paul then walked around Asia Minor, Greece, and Italy, founding synagogues to worship **Jesus** and converting Jewish synagogues to **Jesus**, and writing *epistles* / *letters* to these synagogues, explaining that **Jesus** was the promised Jewish Messiah.

AD 36-64

**Paul's
teaching**

Paul was a great missionary and an organizational genius. He wrote Epistles to several groups. **Paul's** epistles were the founding scriptures of Christianity. He spoke Greek to Greeks, as a Jew to Jews. He wrote that **Jesus** was the fulfillment of Jewish prophesies of a Messiah come to Earth to give salvation.

Paul preached to Jews and non-Jews. He formed a noble explanation for **Jesus's** criminal's death, that of a sacrificial person who is offered to God as an atonement for man's sin and the imminent coming of the Kingdom of Heaven, the end of the world.

He preached the ancient Jewish religion of priests with an altar and the proprietary bloodshed, concepts his audiences were familiar with. **Paul** and the apostles gained many followers for **Jesus**. **Jesus's** younger brother **James** was reportedly a leader of **Jesus's** followers, first called Christians in Antioch AD 40, *Acts 11:26*. *Acts 11:26*. Biblical scholars estimate that **Paul** wrote four of the nine *Paul's epistles* ascribed to him.

**A God who
promised
a life in a
heaven was
a powerful
argument**

1Corinthians 15:3-4 said that **Paul** said all of Man's existence with all its religious and philosophical strivings was a divine plan fulfilled in **Jesus's** coming to Earth. And that the Lord so loved man that He sent His only son to be crucified to allow them to enter Heaven.

That God loved people was a radical and powerful and appealing argument. **Jesus** was relevant for **Paul** because his death and resurrection were said to prove that he was the Messiah.

Paul also said that **Jesus** would soon return to Earth to restore the kingdom of Israel.

Apostles 1:6. **Paul** was arguably the most consequential person in Western history when he preached that all humans who did not accept **Jesus** as Lord could suffer eternal torture by fire.

AD 36-64

Paul planned to use Rome, far from Judea, as the base for this new **Jesus** sect. He wanted to admit gentiles without requiring circumcision. **James** disagreed. Kings: **Paul** knew the value of being friendly with civil authorities. "Powers that be (kings, dictators, etc) are ordained of God . . . they that resist [the kings] shall receive to themselves damnation." *Romans 13:1-7*. "Honor the king" *1Peter 2:17*. He preached turning the other cheek /pacifism and obedience to civil rulers, even to non-Christian fools or cruel men like **Nero**, **Caligula**, and **Claudius**. **Paul** chose expediency . He changed the image of **Jesus** from an itinerant Jewish rabbi into the traditional Jewish *Messiah* that many Jews were awaiting.

**Rationalism
vs. reason**

For traditional Jews around this time, the notion of a Jewish afterlife and belief grew as a criterion for being in God's good grace. Such belief contrasted with Greek respect for reason (that Man can reach truths about the world through reason). The *Hebrew Bible* spoke only to Jews. *Genesis*, the first book of the *Hebrew Bible*, relates that Adam and Eve disobeyed God when they ate the fruit of the tree of

c.AD 36-64	knowledge which caused God to banish them from the Garden of Eden. This became the basis of Christianity's most-important doctrine of <u>Original Sin</u> , which was not mentioned in the <i>Hebrew Bible</i> .
Miracles proved Jesus was God	<u>Christological Arguments</u> : Paul's argument that Jesus was God is an <i>Argument from Miracles</i> . Jesus caused miracles and was resurrected. Thus he is a god. This is called a <i>Christological Argument</i> . [A miracle is defined as a supernatural / divine violation of natural law.] The logic is sound; if someone preforms a supernatural act, a miracle, a violation of natural laws, he is by definition a god of some sort. The Greek, Roman, and other Middle Eastern gods at the time all purportedly had various limited supernatural powers. Belief in numerous gods & their power was common.
Jewish-Christian dogma	Another <i>Christological Argument</i> is that Jesus was a great moral leader who said he was God and wouldn't lie. Paul based his entire belief in Jesus as God on the proposition that Jesus came back to life. He said, " <u>If Christ has not risen, then is our preaching vain and your faith is also vain.</u> " <i>1Cor.15:12-17</i> .
Slavery is OK.	Jews, like other Mid-East religions, owned slaves, considered women inferior and their property, kings as absolute rulers. These are concepts considered false and cruel to educated Westerners today.
c AD 36-64	<u>Slavery</u> : Paul approved of the Jewish ownership of slaves. He told slaves, "Servants, obey in all things your masters on singleness of heart, fearing God. And whatsoever ye do, do it heartily, as to the Lord." <i>Colossians 3:22-24</i> . "Exhort servants to be obedient to their masters, and to please them well in all things." <i>Titus 2:9</i> . "Servants (slaves), be obedient to those who are your masters . . . with fear and trembling, in singleness of your heart . . . as the servants of Christ, doing the will of God from the heart." <i>Ephesians 6:5, 6, 7</i> . The 10 th Commandment approved of slavery. "Thou shall not covet your neighbor's wife. . . nor his slaves." (The Muslim <i>Qur'an/Koran</i> later also OK'ed slavery. Mohammed owned slaves.)
Male superiority. Men owned women totally	<u>Male superiority</u> : Paul instructed the new Christian Jews's wives, " <u>Wives, submit yourselves unto your own husbands</u> . The husband is head of the wife even as Christ is head of the Church. <u>Let the wives be subject to their own husbands in everything.</u> " <i>Ephysians 5:22-24, Col. 3:18. Titus 2:5</i> "Neither was the man created for the woman; but the woman for the man." <i>1Corinthians 11:3, 11:9</i> .
Women, keep silent	<u>Women</u> : <u>Have your women keep silent</u> in the synagogues: for it is not permitted unto them to speak; but they are commanded to be under obedience, as also saith the law." <i>1Cor.14:34-35, 5:33, and Col.3:18</i> . Let the woman learn in silence, with all subjection. I suffer not a woman to teach or to usurp authority over man, but to be in silence. <i>1Tim. 2:11-12, Titus 2:5</i> . Women are the weaker sex, <i>1 Peter 3:7</i> . Women's <i>natural use</i> is to have sex with men. <i>Romans 1:27</i> .
c AD 36-64	<u>Homosexuals and effeminate men</u> : are "worthy of death" <i>Romans 1:31-2; 1 Cor.6:9-10, 1Tim 1:10</i> , like the <i>Old Testament, Lev.20:13</i> .
Christianity's given reason to exist was salvation from Hell.	<u>Original Sin</u> : Paul's <i>Romans 5:12-21</i> "Therefore, just as sin entered the world through one man, and death through sin, and in this way death came to all people, because all sinned"). Out of this, Augustine (AD 413) interpreted the doctrine of <i>Original Sin</i> . <u>Salvation</u> : Paul said <u>saving one's soul from eternal torture in Hell was the only important thing</u> . Paul thus put the fear of torture for eternity in Hell into every Christian Jew for something they had no responsibility for or control over, unless they accepted Paul's God as their Lord. One could be saved by God's grace.
Name a peril, promise a cure	Paul's Christianity of predicting a peril and offering a solution (on the speaker's terms) is a technique well known to salesmen, demagogues, and politicians. In advertising, it's called "manufactured need."
Second Coming.	<u>Jesus's</u> imminent return, the <i>Second Coming</i> : Paul's <i>First Epistle to the Thessalonians 4:13-18</i> (c.49 first epistle) described Jesus's return to Earth. His coming would be soon and would be visible. <i>1Tim. 6:14, 2 Tim. 4:1</i> . "Behold, I am coming soon . . . to repay each one for what he has done." <i>Rev. 22:12</i> . <u>The reward for the faithful</u> was resurrection and eternal life in Heaven as Jesus had been resurrected. Christian Jews believed that worshipping God was the meaning of life. To achieve this, one must ask for forgiveness of sins and receive God in one's heart. As the end of the world was imminent, scientific study of the natural world was unimportant. So this belief had a lasting foolish harmful effect on the study of science for millennia. Paul taught that the kingdom of Jesus was in Heaven, not on Earth.
The Church fought science for millennia.	
c.AD 45 Seneca explained philosophy	<u>Rome, Philosophy</u> : Lucius Annaeus Seneca / Seneca the Younger (c.4 BC-AD 65), a Roman Stoic philosopher, statesman, and playwright, explained philosophy. "Philosophy is not a trick to catch the public; it is not devised for show. It is a matter, not of words, but of facts. It is not pursued so that the day may yield some amusement before it is spent, or that our leisure may be relieved of a tedium that irks us."
Philosophy	"It molds. . . the soul; it orders our life, guides our conduct, shows us what we should do and what we should leave undone; it . . . directs our course as we waver amid uncertainties. Without it, no one can

live fearlessly or in peace of mind. Countless things that happen every hour call for advice; and such advice is to be sought in philosophy." "A hungry people listens not to reason, nor cares for justice, nor is bent by any prayers." He said that some follow natural laws, not the whims of gods.

c AD 50 **Reason in China: Wang Ch'ung** China was then the most advanced nation: *Daoism* had degenerated into superstition and magic. **Confucius** was worshiped as a god. *Feng Shui* began to rule men's lives. **Wang Ch'ung** (AD 27-c.97), a poor but learned man; studied by reading at book stalls. He derided superstitions, gave natural explanations for natural phenomena. His *Discourses Weighed in the Balance* was a compendium of arguments against "magical" thinking." It advocated Naturalism. He said, "If the heavens had produced man on purpose it ought to have taught them to love each other, not destroy." He wrote rationally on astronomy and meteorology. He accurately described the water cycle. His book, *Lun-heng*, also criticized Chinese superstitions. He ridiculed the idea that Man had a special place in the cosmos or a life after death

c.AD 50 Physics, Alexandria: **Hero** (c.AD10-70) Greek, a teacher at the Library of Alexandria, figured out a formula for the area (A) of a triangle when its height was not known, "A = square root of s(s-a)(s-b)(s-c) where a, b, and c are the sides, and "s" is half the perimeter." He also devised a primitive impractical steam engine, where a metal rotating sphere filled with water is heated and the escaping steam is directed in one direction, causing the vessel to rotate in reaction. He described the five simple machines for moving weights: wheel/axle, lever, pulley, wedge, and screw.

c AD 36-64 **Paul founded dozens of Christian sects** Christianity: **Paul** created the Christian religion. He founded dozens of churches with different dogmas and beliefs but with the story of **Jesus** and salvation. By AD 100 there were around 50 Christian communities around the Mid-East, mostly former Jews. The Christian Church did not become the Christian Church until Constantine forced it to become more or less united with paganism. **Paul** attacked Greek rational thinking with his attack on "the wisdom of the wise" and "the empty logic of the philosophers," but later Christian thinkers depended heavily on Greek modes of thought. **Jesus's** "Christianity" thus began without rituals, altars, or temples, just apostles preaching. This oral practice was gradually replaced by writings. Its only "scriptures" before the *gospels* were the *Hebrew Bible* and **Paul's** writings. **Paul** reportedly died in Rome around AD 64.

The Christian community in Jerusalem was led by **James**, the brother of **Jesus**. According to *Acts 9:1-2*, they described themselves as "disciples of the Lord" (their Jewish lord) and [followers] of "the Way."

Christianity: **Jesus** always considered himself Jewish. He made no effort to create a new religion. He maintained God's will could be found in the Jewish scriptures, especially the *Law of Moses*. **Paul** taught that **Jesus's** death and resurrection fulfilled Jewish prophesy. As **Paul's** and the apostles' preachings spread and their sect institutionalized, **Jesus** was the inspiration, not the founder of Christianity. So, to the extent that Christianity today differs from Judaism, it differs from **Jesus's** thought.

Including Gentiles? The main concern of **Paul's** epistles to the synagogues / churches he founded was the inclusion of gentiles into the community, deeming faith in Christ sufficient for righteousness. Partially due to this inclusion of gentiles, early Christianity changed its character and gradually grew apart from Judaism.

Faith, Hope, and Charity **Jesus's** virtues of faith (the greatest virtue), hope, and charity undercut the four Roman virtues. **Jesus's** message was largely (not entirely) love, compassion, charity.

As many Jews already believed a Messiah would come, **Paul's** job was eased.

Jesus, the loving son of the harsh judgmental Hebrew God, as Messiah, was a break from and the fulfillment of Jewish belief. Converts to the movement grew slowly, mainly in urban areas, and, like Jews had always done, formed close communal communities, a factor which helped them survive and prosper.

AD 70 Romans win: The Jews rebelled against the Romans. In AD 70, the Romans totally crushed them and destroyed their temple in Jerusalem, a huge blow. Some Jews held out until AD 72 on Masada, a mesa in Southern Israel. The Christian-Jews were a struggling minority during this time..

c AD 65-90 **The Gospels (gospel means good news)** The Gospels: Decades after **Paul** died (c AD 64), the four *Gospels* were written, in Greek. The *Gospel* attributed to **Mark** was likely written AD 70, then **Matthew** and **Luke** AD 80-85, **John** c.AD 90-95. So it's likely whoever wrote the Gospels never met **Jesus**. They relate that **Jesus** was a rabbi (teacher preacher) who walked around Judea preaching and performing miracles. Some passages in the gospels, like a god being born of a virgin, were common in many other religions around the Med.

Biblical scholars accept two incidents as reliable descriptions of events in **Jesus's** life, his baptism by **John the Baptist**, *Matt. 3:13-16* and *Mark 1:1-11*, and his crucifixion by **Pontius Pilate**.

Gospels tell **Mark** is the shortest Gospel with 661 verses, 600 of which are also in *Matthew* and 350 in *Luke*. Some

Jesus's life of these verses are copied verbatim. So *Mark* was apparently a source for *the gospels of Matthew* and *Luke*. There are also some verbatim verses in *Matthew* and *Luke* that are not in *Mark*. They were all written in Greek. The disciples were illiterate fishermen who spoke principally Aramaic although a few also spoke Greek. *Mark's Gospel* did not mention **Jesus's** virgin birth or his resurrection.

Jesus's birth: *Luke 2:1-15*, written AD 80-85 says Jesus was born in Nazareth as a Roman census forced **Joseph** and **Mary** to go to **Joseph's** birthplace. There is no historical record of a census.

Harsh but also Compassion tolerance, mercy *The Gospels* say that **Jesus** agreed with the harsh Jewish laws in the *Torah*, and the Jewish doctrine that other religions were false, *Matt. 5:17-20, 15:4, Luke 16:17, and Mark 7:9-10*. Other verses relate that **Jesus** also preached compassion, tolerance, love, and mercy, a simple and a profound doctrine of a loving universal fatherhood of God. For example, *The Sermon on the Mount* (111 verses), "Blessed are the poor, the meek, the pure in heart," *Matt. 5:3-11*. Love thine enemies . . . do good to them." *Matt 5:44*. "Judge not, lest you be judged." *Matt 7-1, Luke 6:37, &*, "Give to him that asketh thee, and him that would borrow of thee, turn thou not away." *Matt. 5:42. & Matt. 25:34-36 and 45* are particularly compassionate.

c.AD 70-95 *Riches:* *The Gospels* say **Jesus** said, "If thou wilt be perfect, sell what you have and give to the poor. You will have treasure in Heaven." *Luke 18:22*. "You cannot serve God and money." *Matt. 6:19*. "A rich man shall hardly enter into the Kingdom of Heaven. It is easier for a camel [or a rope, same word] to go through the eye of a needle than for a rich man to enter the Kingdom of God." *Matt. 19:21, 23-4. Luke 18:25*.

Slavery is OK *Slavery:* *Matt 22:21* repeats *The Hebrew Bible's* and **Paul's** approval of slavery. "Render unto Caesar the things that are Caesars." **Jesus** cured a slave but didn't free him. *Luke 7:2*. Slaves should regard their own masters as worthy of all honor. *1 Tim. 6:1*. *The Bible* has no statement of **Jesus** critical of slavery

Gospels said Jesus will return soon *Jesus's Second Coming:* Like **Paul's** epistles, the *Gospels* stressed that Man's salvation depended on **Jesus's** return, which would end the world. *Matt. 24:37, 39, 42, and 44. Luke 19:15, John 14:3*. fulfilling Jewish prophesy. Such imminent return would occur before the deaths of some who were hearing him. *Mark 9:1*. The prospect of a life in heaven was a powerful recruiting tool. The rise in Christianity hindered the Greek interest in science and made long term thinking, like science, unimportant.

Christian Churches, and belief in the Second Coming have delayed studying the natural world *The Christian Churches with their belief in a Second Coming have been the most powerful deterrent to the study of science throughout history. First, in the first years of Christianity by saying that the world would end imminently made the study of science irrelevant and still does to this day.*
Secondly, through history, the discovery of natural laws that govern how things happen has destroyed the churches' previous monopoly of explanations of natural events and therefore their power.
The Christian churches have caused untold numbers of people to live their entire lives in abject terror of spending eternity in excruciating pain in Hell. Tens of millions have killed or were killed in wars believing in their supernatural force or entities. The hostility of Western religions to science is the strongest back-story regarding the advance of science. .

Ask and ye shall receive *Prayer:* *The Synoptic Gospels* all say that God will give believers what they pray for. Specifically: "Ask, and it shall be given you . . . For everyone that asketh receiveth." *Matt. 7:7-8*. "If two of you shall agree on earth as touching anything that they shall ask, it shall be done for them of my Father who is in heaven." *Matt. 18:19*. "Whatsoever ye shall ask in prayer, believing, ye shall receive." *Matt. 21:22*. "What things soever ye desire, when ye pray, believe that ye receive them, and ye shall have them." *Mark 11:24*."

Gospel of Matthew *In the Gospel of Matthew (AD 80-85), is Paul's claim that Jews caused Jesus's death: Matt. 27:11-23; John 19:7, 12, 14-15, and Paul's statement, "Ye Pharises, ye generation of vipers." Matt. 23:33, & Matt. 3:7.*

The New Testament: Bring my enemies & slay them before me. *Sex:* Looking lustfully on a woman is a sin. *Matt. 5:28-30*. It is good for a man not to touch a woman. *1Cor. 7:1*. *Mary:* *The New Testament* mentions **Jesus's** mother, **Mary**, a few times. *Unbelievers:* will be "cast into the fire." *Matt. 13: 38-42, 2 Thess. 1:7-10. Mark 16:16, Luke 3:6*. **Jesus** said, "My enemies who don't want that I should reign over them, bring here, & slay them before me." *Luke 19:27*.

These verses are not messages of love. *Parents:* "I have not come to bring peace but a sword. For I am come to set man against his father, and the daughter against her mother . . . and the daughter-in-law against her mother-in-law . He that loveth father or mother . . . or son or daughter more than me is not worthy of me." *Matt. 10:34-37*. "Any man who hate not his father, mother, wife and children..cannot be my disciple." *Luke 14:26*. *Unruly children:* He that curseth father or mother, let him die the death. *Matt. 15:4-7; Mark 7:9-13;*

New *Jesus's miracles in the New Testament:* **Jesus'** miraculous conception by the Holy Ghost to a virgin

Testament Miracles	<i>Luke 1:35.</i> The Star of Bethlehem appeared and led the wise men to the baby Jesus. <i>Matt 2:2.</i> Jesus stilled a storm <i>Matt 8:23. Mark 4:37-39; Luke 8:22.</i> Jesus turned water into wine. <i>John 2:1-11.</i> Jesus walked on water. <i>Matt 14:25; Mark 6:48, John 6:15.</i> Jesus fed 4,000 people from 7 loaves and a few fish <i>Matt 15:32-38; Mark 8:1.</i> Jesus raised a widow's son at Nain <i>Luke 7:11-18.</i> Lazarus was raised from the dead <i>John 11:38-44.</i> Jai'rus's daughter was raised from the dead. <i>Matt 9:23; Mark 5:23; Luke 8:41.</i> A demoniac man was cured in a synagogue at Caper'naum. <i>Mark 1:23; Luke 4:33.</i> Jesus was resurrected after being declared dead and buried. Jesus ascended into Heaven <i>Luke 2:42-51.</i>
c.AD 35-64	Jesus's healings: 2 blind men <i>Matt 9:27-31.</i> A deaf and dumb man <i>Mark 7:31-37.</i> A blind man of Beth-sa'i-da <i>Mark 8:22-26.</i> A woman with the spirit of infirmity <i>Luke 13:11-17.</i> A man with the dropsy <i>Luke 14:1-6.</i> Ten lepers. <i>Luke 17:11-19.</i> A nobleman's son at Caper'naum. <i>John 4:46-54.</i> An impotent man at Beth-sa'i-da. <i>John 5:1-9.</i> A man born blind. <i>John 9:1-7.</i> A Syrophoenician woman's daughter <i>Matt 15:28; Mark 7:24.</i> A Centurion's servant <i>Matt 8:5; Luke 7:1.</i> A blind and dumb demoniac man <i>Matt 12:22; Luke 11:14.</i> A leper <i>Matt 8:2; Mark 1:40; Luke 5:12.</i> A man sick of the palsy healed <i>Matt 9:2; Mark 2:3; Luke 5:18.</i> A man's withered hand healed <i>Matt 12:10; Mark 3:1; Luke 6:6.</i> A lunatic child <i>Matt 17:14; Mark 9:14; Luke 9:37.</i> A blind men instantly healed <i>Matt 20:29; Mark 10:46; Luke 18:35.</i>
Scholars call it The Silence of Paul.	<u>The Silence of Paul:</u> Assuming that the <u>epistles</u> in the <i>New Testament</i> attributed to Paul were more or less what he wrote, it is relevant that he never mentioned any miracles of Jesus other than his resurrection. <i>The Gospels</i>, however, written after Paul died, have many stories about Jesus's miracles. <u>This strongly suggests</u> that they were written in order to attract followers to Paul's new religion.
Paul never mentioned any Jesus miracles, 3 wise men, virgin birth, water/wine	Paul never mentioned any of Jesus's purported miracles. Mary's miraculous conception, Jesus's virgin birth, the Star in the East, the three wise men, feeding thousands, turning water into wine (Dionysus reputedly could also do this), Jesus's healings, the parables of the <i>Prodical Son</i>, the <i>Good Samaritan</i>, and the <i>Sermon on the Mount</i> (<i>Matt. 5-7</i>), were in the <i>Gospels</i>. It isn't credible that Paul didn't know of these significant God-like events. If they actually had occurred he surely would have mentioned them. This doesn't infer that Jesus didn't exist, but it does question whether the miracles did.
Paul cited the Lord, not Jesus	<i>New Testament</i> scholar Gerd Lüdemann, German, says of Paul: "Not once does Paul refer to Jesus as a teacher, to his words as teaching, or to [any] Christians as disciples. In this regard it is significant that when Paul cites sayings of Jesus, he only says the Lord."
The New Testament examined	"Paul presumably believed that a man named Jesus had lived and that he now sat at the right hand of God in heaven. But Paul shows only a scant acquaintance with traditions [like miracles] related to Jesus's life and nowhere an independent acquaintance with them. In short, Paul cannot be considered a reliable witness to either the teachings, the life, or the historical existence of Jesus." Paul spoke about the risen Jesus, but never mentioned Jesus's purported empty tomb. That event was first mentioned in the <i>Gospel of Mark</i>, written decades later."
"The Silence of Paul"	"One theory advanced by Christian theologians about Paul's omission of the empty tomb is that he considered the resurrection a spiritual resurrection, not a physical one. Other theories include the <i>Apparent Death Theory</i>, the <i>Swoon theory</i>, the <i>Occupied Tomb Theory</i>, and the <i>Hallucination Theory</i>.
c.AD 70-95	<i>Gospels</i>: Jesus teachings weren't reasoned arguments like Greek rationalists, but commands like the Jewish God's. Jesus's teachings dealt with <i>thoughts</i>, sinful and compassionate, like Love thy neighbor. In contrast, <i>The Hebrew Bible's</i> commands dealt mainly (not solely) with actions, not thoughts.
Contradictions among the Scriptures. Other earlier religions had the same or similar stories	The <i>Gospels</i> are mostly duplicative but often contradictory accounts of Jesus's life and sayings. <i>The gospels</i> attributed to Matthew, Mark, and Luke, called the the <i>Synoptic Gospels</i>, are most alike. Many events related in the <i>Gospels</i> are strikingly similar to accounts in earlier scriptures of other religions's pagan myths, and Greek literature. The contradictions among the gospels about Jesus's life, the miracles that Paul didn't mention, the passage of time before the <i>Gospels</i> were written, their copying and recopying over the centuries, as well as the Christian Jews need for a real God, make the gospel accounts uncertain. Who all the disciples actually were is uncertain as the four <i>Gospels</i> have different names for some. Nothing Jesus may have written exists. All statements in the <i>New Testament</i> attributed to Jesus are second or third hand hearsay.
An afterlife	<u>Afterlife:</u> Egyptians who died and were judged bad were eaten by a combination hippo/ lion/ crocodile. The afterlife for Greeks and Romans was neither a heaven or a Hell, just where dead people went. The <i>Hebrew Bible</i> has a realm called <i>sheol</i>, the underworld place of stillness and darkness where dead Jews go. <u>Buddhists had eight levels of hell.</u> Taoists countered with ten. Buddhists replied with eight cold levels and eight hot ones. The bidding went up until the Buddhists claimed 84,000. The Taoists gave up.

Christianity: The Christian-Jewish sect was becoming an sect apart from traditional Judaism, but still Jewish. The early Christian-Jewish communities elected their leaders, later called bishops. They taught that Man's duty to God was more important than Man's duty to the state. This of course frequently led to disputes with their Roman overlords. Concurrently, the Christian-Jews insistence that **Jesus** was divine and **Jesus's** teaching that God was merciful caused an inexorable split with traditional Judaism.

Christian-Jews were a minority but growing in the Roman realm.

New Testament, Mithraism, Gnostics.

Christianity: Christian-Jewish writings (like the gospels) were being written and collected. The myths of the mystery religions and the then popular pagan religion, Mithraism, the religion of Osiris, the Phrygian, Cybele, and Greek philosophy all were known to **Jesus's** followers and they influenced one another.

Plato's "soul" fit nicely into Paul's teachings.

Certain Christians' writings of the Gnostics, Marcionists, an early Christian-Jewish text on ethics, *the Didache*, and the *Gospel of Thomas* were not included in the group of writings that came to be called *The New Testament*. Gnosticism was an esoteric cult of divine knowledge melding Christianity, Greek (like **Plato's**) philosophy, Hinduism, Buddhism, and the mystery cults. They believed that salvation came not just from worshiping **Jesus** but in study to free one's self from the material world. **Plato's** "soul" apart from one's body fit nicely into **Paul's** teachings.

Stoicism influenced the Scriptures

Philosophy: Stoicism's concepts of universal love, the virtues of justice, compassion, and restraint also influenced early Christian writings. Christian-Jews followed most of the Hebrew God's beliefs about God, particularly his omnipotence, omniscience, benevolence immanence, and transcendence, as well as the creator of all things. Christians added the notion that **Jesus** fulfilled Jewish prophesies.

c.AD 83 Botany: **Dioscorides's** (AD 40-90) *De Materia Medica*, had 500 medicinal plants, the definitive medical & botany text for c1,600 years. Romans invented books, sheets of papyrus bound, to replace scrolls.

Gospels

Theology: The *Gospel of John*, probably written AD 90-95, was the first to declare **Jesus** divine. It has a more theological interpretation of **Jesus**, who is quoted, "Verily, verily, I say unto you, **Before Abraham was, I am.**" *John 8:58*. "He that believeth on the Son hath everlasting life, and he that believeth not the Son shall not see life; but the wrath of God abideth on him." *John 3:36*. "I and the Father are one," *John 10:30*.

And "He that hath seen me, hath seen the Father." *John 14:9*. Neither **Paul** or the other gospels made the divinity claims **John** made. *John 20:29* **says Jesus** said to **Thomas**, who first doubted that he, **Jesus**, had risen from the dead, "Because thou hast seen me, thou hast believed: blessed are they that have not seen and yet have believed."

God gave his Son so that whoever believes in him shall have eternal life.
"In this world you will have trouble. But take heart! I have overcome the world." *John 16:33*.

Ask and ye shall receive

Also, "Whatsoever ye shall ask in my name, that will I do . . . If ye ask any thing in my name, I will do it." *John 14:13-14* "If ye abide in me, and my words abide in you, ye shall ask what ye will, and it shall be done to you." *John 15:7* and *John 16:23-24*. **Jesus's** promise to believers was simple. But promises are only promises. Christian theologians have ever since argued that these words don't really mean what they plainly say. They have given numerous reasons for why **Jesus** didn't do what he promised. (See p. 413)

Omnipotent

Paul wrote, "For His invisible attributes, namely, his eternal power and divine nature, have been clearly perceived, ever since the creation of the world." *Romans 1:20*. "Just as Christ was raised from the dead by the glory of the Father." *Rom. 6:4*. "I have made you the father of many nations" -in the presence of the God in whom he believed, who gives life to the dead and calls into existence the things that do not exist." *Rom. 4:17*."

Social control of the masses

Life was hard for the mass of people, full of miseries and sufferings. A powerful idea is to imagine a better life somewhere. Most religions at the time, like the cults of Isis and Serapis, *Mithraism* (Sun worshipers, Persia), *Hinduism*, Sikhs, and later *Islam*, promised a better life after death, a heaven, or a better reincarnation (or a hell or worse reincarnation), all dependent on one's conduct in this life.

c AD 96 Heaven

Most biblical scholars say that *Revelation*, which describes the Christian Heaven, was written perhaps around AD 96. The concept of a Heaven for good people and a Hell for sinners is an extremely effective concept for controlling people in this life. It deters believers from sinning or from revolting, as they could envision a good life after death (if they are virtuous/obedient in this life).

c AD 96

As previously noted for Egyptians (ref. 2,700 BC), a heaven and a hell is an effective social control. It quiets those who see evil men prosper, believing that they will be punished in Hell someday. **Elbert Hubbard**: "Formal religion was instituted for slaves. It offered them consolation which Earth did not provide."

Christians adopted the concept of a Heaven. The Christian afterlife promised a new blissful life open to all and differed from the Egyptian afterlife where the slaves stayed as slaves.

Christian Heaven **Heaven:** Christians who are saved and sins forgiven go to Heaven and become angels. Heaven is a walled city. The first foundation of the wall is jasper, the second sapphire, the third chalcedony /agate, the fourth emerald, the fifth sardonyx /onyx, the sixth sardius /ruby, the seventh chrysolite, the eighth beryl, the ninth topaz, the tenth a chrysoprasus /turquoise, the eleventh jacinth, and the twelfth amethyst. The twelve gates were twelve pearls; every gate is one pearl; the street of the city was pure gold.

Christian Heaven God sits on a throne which has a rainbow around it. Four beasts, each with six eyes and six wings, one with the face of a man, sit around God day and night singing, "Holy, Holy, Holy, Lord God Almighty, which was, is, and is to come." 24 elders dressed in white with gold crowns sit around God and worship him.

Angels stand around singing praises of God Multitudes of angels stand around God singing "Amen, blessing, and glory, and wisdom, and thanksgiving, and honour, and power, and might, be unto our God for ever and ever. Amen." There is no Sun or Moon as God's light lights everything.. There is no sorrow, no pain, no sin, no hunger, no thirst, no crying, no illness. This continues forever. *Revelation 4:2-9, 7:12, 15, 21: 12-21, 22:5.*

Alfred North Whitehead (1912) asked, "What kind of deity is it that would create angels and men to sing his praises day and night to all eternity?" This is a modern judgment. But, realistically, at the time, for almost all people, it probably was better than the backbreaking drudgery and pain of stoop labor in a field working from dawn to dusk *every single day til you die.*

Ritual vs. belief Greek and Roman religions emphasized ritual. Early Christian-Jews had no *rituals*. They had beliefs. *Belief* is important in the *New Testament*. Thus, in *Mark*, "Everything is possible for him who believes." And, **Jesus** said, "If ye have faith . . . nothing shall be impossible unto you." *Matt. 17:20.*

Three common concepts, 1. Heaven as life's goal. 2. Heaven for all. 3. God is a man-God **Dogma:** Christianity, Mahayana Buddhism, and Hinduism all had three fundamental features not all found before. 1. Defining the goal of human life as eternal life in a blissful afterworld. This differed from the Egyptian and Megalithic religions which merely promised a continuation of one's current life. 2. All classes importantly including women could partake of the better afterworld. 3. Its savior was a God who was both a person and at the same time was universal, a god-man who was to lead persons to salvation. The three religions had room for lesser holy entities, saints, local gods, spirits and angels. Christians and Buddhists associated salvation with an ethical code, giving priests more control over peoples' daily lives than ritual-based religions. **William McNeill.**

c AD 70- 100 **Paul created Christianity, not Jesus** **Christianity:** **James D Tabor**, a Biblical scholar, "The fundamental doctrinal tenets of Christianity, namely that Christ is God "born in the flesh," that his sacrificial death atoned for the sins of all people, and that his resurrection from the dead guarantees eternal life to all who believe, are the words of Paul, not Jesus. Indeed, the spiritual union with Christ through baptism, as well as the "communion" with his body and blood through the sacred meal of bread and wine, are also **Paul's** ideas. Thus Christianity had the creeds and confessions that separated it from Judaism and started it to becoming a new religion." **Tabor:** **Paul** led the church in its decisive break with the Ebionites, whose teaching contained teachings of **Jesus**. *2 Thessalonians*, which is considered by many scholars to be a later forgery, has **Paul** referring to eternal castigation for sinners. *1:6-9.* The Christian hell is a lake of fire."

Robert Eisenman **Theology:** **Robert Eisenman**, a professor of religion "**Paul's Christianity tamed a dangerous sect among radical Jews and made it palatable to Rome.** It was essentially based on Rome and used Rome's administrative skills and its system of organization with a single bishop for each town." A current eminent Biblical scholar, **Bart Ehrman** says that this was how Christianity became dominant.

Biblical interpretation Parables, Contradictions, **Textual analysis:** Some sayings attributed to **Jesus** were sometimes obscure, so they were considered parables, causing millennia of interpretations. In modern biblical scholarship, there are numerous unresolved issues as to who actually wrote what passages, and for what purpose, and what was modified over the centuries as the *New Testament* was compiled and recopied by different scribes. In the West, all writings were hand copied until printing in 1454. Biblical scholars agree that the *New Testament* had revisions even before being adopted as the definitive Christian scriptures. The substance of all the revisions is uncertain and subject to studies and theories. Some scholars say that some copyists sought to blend their copies of the *New Testament* with the *Hebrew Bible*.

c AD 100-150 **Early Scriptures:** **Bart Ehrman's** book, *Misquoting Jesus* (2005), described some inconsistencies and discrepancies in biblical manuscripts that could not be harmonized or reconciled. He said, "We had over 5,000 manuscripts of the *New Testament* (all of course handwritten), and no two of them are exactly alike."

When producing new copies, “the scribes were changing them, mostly in little ways, but sometimes in big ways.”

Ehrman states that many passages now accepted in the *Bible* were not innocent mistakes by copyists but deliberate changes by the copyist. He asked that if God went to the trouble of inspiring the text, why didn't he go to the trouble of preserving it? Why did he allow scribes to change it?"

One reason for the discrepancies is that the persons who wrote the various parts of the Bible did not know they were writing a bible.

Christianity's promise: You will have comfort in Heaven Theology: Discussing the dogma of a particular religion developed with the rise of Christianity. *The Hebrew Bible* had mainly rules of social *behavior*. In the East, the Hindus, Buddhists, and Confucians had little need for theology. **Jesus's** message of hope appealed particularly to the poor, a message rare in their difficult world, but in Heaven, where they would live in eternal comfort and happiness. Paganism remained the main "religion" for Romans until **Constantine**, AD 313.

But you must do as God says. The basic theme of the *Bible* is obedience to God who commands how one acts and what one thinks, [and God *knows* what you are *thinking*]. No book has had as decisive and continuing influence in the Western world's legal and ethical precepts, its realism, regarding Man. The Greeks had shown the power of the human mind; Christians looked to Man's soul. Christians changed **Plato's** soul into one's conscience.

c.AD 100 **Ethics** Ethics: Epictetus (c.AD 65-c.AD 135): a Greek stoic, wrote *The Art of Living*, "The good life is a life of inner tranquility coming from conforming nature to reason and to truth." To achieve the good life, man must master his desires, perform his duties, and think correctly about himself and the world."

Epictetus Quotes "Only the educated are free." and "No man is free who is not master of himself." "The beginning of philosophy is a consciousness of your own weakness and inability in necessary things. Every man has a duty to others because every man is a citizen of the world." "Don't just say you have read books. Show that through them you have learned to think better, to be a more discriminating and reflective person. Books are the training weights of the mind. They are very helpful, but it would be a bad mistake to suppose that one has made progress simply by having internalized contents." "All religions must be tolerated . . . for every man must get to heaven in his own way." Books were rare. Very few could read.

c.AD 125 Christianity: Justin Martyr (c.AD100-c.165), a Christian Jew, a *Platonist*, argued that Christian Jews should use scriptures and Greek philosophy, and could even appropriate philosophy for its own ends. Platonists had the concept of an unseen immaterial world in which "the Good," or God could be described as absolute, while at the same time being able to have a creative and loving role.

c.AD 105-300 **China** Chinese technology: Ts'ai Lin developed paper around AD 105 using wood pulp and rags. Chinese boats had a center rudder and watertight compartments (not used in the West for almost 1,800 years). China had a globe by AD 124, seismograph, suspension bridge (not iron), a rotary winnowing fan by AD 132, and aluminum by AD 300. *Buddhism* reached Central Asia and China.

c.AD 125 **Elisha ben Abuyah** (c. 70-AD 135), a respected rabbi, after seeing a child die needlessly, said, "There is no justice, and there is no judge." He was excommunicated and shunned by his fellow rabbis.

c.AD 150 **Marcion** Christian-Jews: The authors of the *Gospels* were only named in the second century. **Marcion**, a leading Christian in Rome, likely edited **Luke's gospel** and **Paul's epistles** (not all likely written by **Paul**.)

An important doctrinal dispute arose when **Marcion** argued that as **Jesus** was wholly a peaceful God of love and mercy, not like the vindictive/uncompassionate Hebrew God, that there should be one book as the authoritative sacred writings of "Christians" and to disregard *Hebrew scriptures*.

He established a Christian Church with **Jesus** as the son of an ineffable god of true love. His Church competed with the main Christian Church until its bishops convinced the Roman emperor, **Theodosius** (AD 379-395), to condemn any deviation from the main Christian Church..

Christian-Jews kept the Hebrew Bibl The converted Jews in the Christian Jewish community wanted to keep Hebrew Scriptures as part of their holy scriptures. So the concept of Satan with supernatural powers, inconsistent with monotheism, which the Jews had adopted from Persian myths, became part of Christian-Jewish thought. Almost everybody was illiterate, so Sabbath reading of scriptures was important to maintain their communities. While Christians accept the books of the *Hebrew Bible*, Judaism does not accept the *New Testament* as Scripture. Jewish scholar **Jacob Neusner** (1932-2016) said, "The two religions represent different people talking about different things to different people."

c AD 150 In Christian Jewish communities, electing bishops became the job only of priests and other bishops. The argument that God exists as the *Bible* says so is called an *Argument from Authority*. It is a circular argument.

George Bernard Shaw

George Bernard Shaw (1916) commented on the early Christians. "Christ, though rejected by his faith as an impractical dreamer, and executed by his contemporaries as a dangerous anarchist and blasphemous madman, was greater than his judges. It is not disbelief that is dangerous in our society; it is belief. No sooner had **Jesus** knocked over the dragon of superstition, than **Paul** set it up again in the name of **Jesus**. There has never been a more monstrous imposition perpetrated than the imposition . . . of **Paul's** soul upon the soul of **Jesus**."

Epicureanism faded

In the first two centuries after Christ, Epicureanism, which had been popular, began to fade as it could not compete with stoicism's ethical system which was more in line with Roman values. Epicureanism also lost influence as its teachings that the soul was mortal, that there was no afterlife, that the gods had little interest in human affairs, and that the goal in life was pleasure, were all inconsistent with the growing influence of Christianity. It was dead by the time of **Augustine** (AD 410). (It revived 15 centuries later.)

c.AD 150
Ptolemy's map

Astronomy: **Ptolemy / Claudius Ptolemeus**, astronomer, mathematician, drew the great map, *Geographica*. He used **Eratosthenes's** lines of longitude and latitude. He accepted **Aristotle's** belief that the Sun and the stars orbited the Earth. He wrote *Almagest*, much copied from **Hipparchus**, It was the accepted but incorrect text for astronomers and the Christian Church for c1,500 years.

Astronomers believed Ptolemy's universe for 1500 years.

Ptolemy said that planets' apparent irregular movements were because they moved in circles. He cataloged 1,028 stars and the size and distances to the Moon and Sun. He posited that all heavenly bodies revolved on transparent perfectly circular celestial spheres, one for the Sun, one the Moon, and five for the then-known planets (each with its own Roman god and internal motive power. Mars, Mercury, Jupiter, Venus, Saturn), and the eighth sphere held the stars, all revolving around the Earth. Astrology, the purported influence of planets on earthly events, became the prevailing "science."

c AD 160 Hindustani *Buddhism* declined under attack by the Hindu Brahmins who saw it as a threat to their authority. It never was a complete religion, i.e., no ceremonies for birth, death, marriage, or other events of life.

c.AD 161-180

Medicine: **Cladius Galen**, a Greek, compiled a book of medical knowledge used until c1550. He said doctors must know logic and medicine. After he dissected a monkey, he said that it was most similar to humans in viscera, bones, veins, nerves, arteries, muscles. He criticized Christians dependence on "faith" without any empirical evidence for their claims. He spoke of Jews and Christians as philosophers and compared **Moses's** cosmology with **Plato's** and **Epicurus's**. **Galen** preferred **Plato's**. Hundreds of **Galen's** anatomical errors were not corrected until 1543 in **Andreas Versalis's** anatomy book.

c.AD 177
Aurelius, a Stoic

Marcus Aurelius (AD 121-180), Roman emperor and scholar, an educated Roman, was indifferent to religion and the gods. He wrote *Meditations*, mostly a mixture of Stoicism and Epicureanism. "Either the gods have no power or they have power. If they have no power, why do you pray to them? But, if they do have power, why do you not pray for them to give you the faculty of not fearing the things you fear, or of not desiring any of the things you desire." "Every instant of time is a pinprick of eternity." "All things are petty, easily changed, vanishing away."

Quotes

Aurelius advised his readers to consider how many persons had gone before them and how many will go after. He persecuted Christians as he saw them as a threat to the Stoic teachers. Said, "If someone can prove me wrong and show me my mistake in any thought or action, I shall gladly change. He said, "I seek the truth, which never harmed anyone: the harm is to persist in one's own self-deception and ignorance." All writings were hand-copied and faced difficulties reaching all Christian communities.

The God that Christians and Jews worship is the God of the *Bible*. It is, *inter alia*, omnipotent (*Gen. 1:1-27, Deut. 4:32-39, Amos 4:13, Col. 1:16-17, Isaiah 44:24*), benevolent (his healings), and omniscient (*1John 3:20, Daniel 2:21*), and thus worthy of worship. How can we call a God a God? Only because it acts as a God.

Problem of Evil: The contradiction of innocent persons needlessly or gratuitously suffering under a powerful loving God came be called the *Problem of Evil*. It referred to moral evils (caused by humans) and so called natural evils (floods, plagues) caused of course by God. The common result of moral and natural evils was that people suffered.

The Problem of Evil became a Christian problem.

Like the *Hebrew Bible*, The *New Testament* has verses of believers asking God for help.

In *Revelation 6:9-10*, likely written AD 81-96. Those slain for God asked Him,

"How long Sovereign Lord . . . until you judge the inhabitants of the earth and avenge our blood?"

So, when **Paul** organized the Christian church and the Christian God was, at a minimum, omnipotent, benevolent, and omniscient, the problem of innocents suffering under such God

became a Christian problem. It is not a theology problem. It is a deductive logical problem. If one accepts the premises that his "God" is omnipotent, benevolent, and omniscient, suffering voids at least one of such "God's" essential attributes" so such perfect "God" does not exist

**Answering
the Problem
of Evil**

. Christians understood the logical power of the *the Problem of Evil* and have proposed arguments to refute it. Some such proposed arguments have attacked the concept of evil. Other proposed refutations say that God is really not omnipotent as the *Bible* says (and so omnipotence is not a premise). Some proposed refutations are variations of the Man's-limited-ability-argument to see how God permits evil or suffering. As the problem was called the *Problem of Evil* when either evil caused suffering, trying to involve "evil" in answering *the Problem* has greatly complicated proposed answers. Various arguments have been proposed which maintain that, while evil exists, God is not responsible for creating evil. Some proposed answers assert that the world is the best of all possible worlds because it allows humans to fully develop.

**The most
powerful
objection to
traditional
theism.**

Richard Swinburne in *The Oxford Companion to Philosophy* wrote, "*The Problem of Evil* has always been the most powerful objection to traditional theism." **Moses Maimonides** (12-13th century), the most eminent Jewish scholar since **Moses**, similarly said, "*The Problem of Evil* is 'the most difficult matter, which is at the root both of faith and of apostasy, with which scholars of all ages, people and tongues have struggled.'" **Hans Kung** (1928-2021), a most eminent Swiss priest / theologian, called the *Problem of Evil* "The Rock of Atheism."

The phrase "natural evil" is today awkward as it is extremely hard for moderns to think natural events are somehow evil. But, before science proved otherwise, God was seen as the cause of natural even (like floods) Moral evils and natural evils both of course cause human suffering. .

**Assuming
God exists
means that
God was
implicitly a
premise.**

Proposed answers to the problem: From the beginning, Christians seeking to answer the *Problem of Evil* first approach was to assume their perfect God existed and devised reasons why their God could nevertheless justify evil or suffering.

This way of attacking *the Problem of Evil* is called the "holiness" problem for a God. But using an assumed God to prove a God does not work The logical fallacy of Begging the Question means the conclusion is explicit or implicit in the premise.

**AD 186
Irenaeus'
answer to
the Problem
of Evil**

Christianity: **Irenaeus**, bishop of Lyon, and a Doctor of the Church, said that the four gospels of **Matthew**, **Mark**, **Luke**, and **John** were inspired by God. Among his notable accomplishments for the Church he proposed an argument purportedly to prove that his Christian God exists but in reality what he said only justifies suffering. His argument assumed his God's existence, not proved it.

In other words, he used his God to prove his God. This is a fatal logical error.

His book *Against Heresies*, argued that humans were created by God in an infantile state and had to grow and develop through experiencing suffering, to fulfil their God-given natures.

He said that genuine human perfection and salvation can only come through humans facing evil and suffering to achieve the spiritual growth necessary to enter Heaven. (**John Hick** (see 1966) posited a similar argument)

He also said that God made people in his own image (*Genesis 1-27*) but not flawless, and as people had *free will*, there is a real possibility people will do evil.

His argument has certain shortcomings aside from the using God to prove God. 1. many sufferings are so severe (or fatal) that they can in no way promote spiritual growth. 2. suffering for spiritual status ignores animal suffering and suffering from natural causes. 3. a person who happens to be very rich or lucky and does not suffer, so does not grow spiritually wouldn't qualify for heaven. .

**Free will &
suffering
are not
logically
comparable.
A category
error**

4. **Irenaeus** said that God's giving Man *free will* is such a great good that it *outweighs any* evil or suffering that may occur. (Logically, this is meaningless as its apples vs. oranges. *Free will* and evil are in different categories of concepts measured by different criteria, a "category error," (This occurs when one applies a quality of one matter to another matter where quality doesn't apply),

Suffering is a condition forced on someone whereas *free will* is one's self generated *ability* to act. This logical analysis is irrelevant as theologies depend on revelations from God, not logic .

We note that *free will* has many appearances in theology, philosophy, neuroscience, and ethics. (See pp.196-198). Suffering is easier to define, it's pain, and varies in severity.

c.AD 190 *The Problem of Evil:* The "evil" in the *Problem of Evil* is one of the two evils, moral and natural, that cause suffering to innocents. *Evil* has many meanings. Theologians and philosophers trying to

deal with the concept of evil to answer the *Problem of Evil* are easily bogged down by the many meanings of evil. The two evils can be accurately replaced simply by the word “suffering.”

Clement:
There's no
such thing
as evil

Christian theologian **Clement of Alexandria** soon illustrated complication this with his answer to the *Problem*. He said, “As God is completely good, he could not have created evil, as evil is merely a privation of good, not a “thing,” so it could not exist.” Tell that to someone suffering. It is wordplay.

The Sumerian *Righteous Sufferer* suffered. Evil was not involved. Job suffered. Evil was not involved. People suffer today under a powerful benevolent God irrespective of the existence or non-existence of “evil.” *Suffering* is the focus of the *Problem of Evil*, not evil.

(Actually, **Augustine** and **Aquinas** both later adopted **Clement's** evil-doesn't-exist argument.)

Clement (and later **Augustine** and **Aquinas**) also saw a problem with claiming God was absolutely omnipotent (like *the Bible* says), and so, to make it easier to say God was “omnipotent”, **Augustine** limited God's omnipotence to just meant that God could do anything he *wished*.

Aquinas made it still easier. He said God's omnipotence only meant He could only do things that were “*logically possible*.” This negates creating the universe and all **Jesus'** healing miracles.

The problem
is more
accurately
called *The
Problem of
Suffering*.

As trivial “suffering” can reasonably be seen as necessary to avoid a greater suffering, i.e., touching a hot stove, the *problem* is limited to *needless* and *pointless* suffering of innocents. **Hume** said if just one innocent person suffers needlessly or pointlessly, *The Problem of Evil* negates God (see 1751).

There is no separate entry for *The Problem of Suffering* in any of the major encyclopedias. Search for it and you will be referred to *the Problem of Evil*. Both names of course refer to the same basic problem, innocents suffering needlessly under an omnipotent benevolent God.

Some encyclopedia articles on the *Problem of Evil* needlessly discuss “Evil”, but it's really irrelevant. (The website for the Humanists UK organization *does* refer to the *Problem of Suffering*.)

“Evil” is
irrelevant
to the
*Problem
of Evil*

A more accurate name for the *problem* is not new. **C S Lewis** (1940), a popular Christian author, called it the *Problem of Pain*. **Bart Ehrman** (ref. 1775 BC, AD 90) has seen the basic *problem* as suffering. His 2009 book, *God's Problem: How the Bible Fails to Answer our Most Important Question-Why We Suffer*, illustrates this. (He also says the biblical responses to the problem are inadequate and easily refuted. See 2009-**Ehrman**).

The *problem* itself has been expressed many ways. (See pp. 407- 410 for many iterations.)

Theology: We will see that in the 18th century **Gottfried Leibniz**, a towering Protestant intellect, proposed several answers to the *problem* that he called “theodicies.” Theologians later devised weaker arguments called “defenses” which argue that there might *possibly* be circumstances where evil and suffering are compatible with the Western God. We discuss these arguments as they arise.

Hell? Hell is not in the *Hebrew Bible*. Pagans and Egyptians had a hell, eternal punishment for the wicked. Not all the early-Christian-Jewish bishops talked of Hell. Christians first taught the pagan doctrine of endless punishment of the wicked under the umbrella of Christianity.

Paul posed Christianity's *raison d'être* as salvation from Hell, a “furnace of fire.” *Matthew 13:50. Revelation 14:10. Paul* then offered salvation, for belief in and obedience to Christ.

c AD 200
**Sextus
Empiricus's
iteration of
the Problem
of Evil**
Most
complete
surviving
account of
Greek and
Roman
skepticism

Philosophy: **Sextus Empiricus** (c.AD 160-c.210, dates uncertain) Greek, was a physician and philosopher. His work is the most complete surviving account of Greek and Roman skepticism (ref. 234-223 BC). He raised doubts about all types of knowledge. He doubted the validity of *Induction* (1500 years before **Hume**), said suspend judgment of all beliefs and ethical pronouncements, act on habit. He did not deny all knowledge, like **Phyrrro**.).

He did not dispute God's existence but denied His omnipotence.

He wrote (here condensed) If [God] takes care of everything, there would be no . . . evil. . . but [there is much evil]. . . either he wishes but is not able [to care for all things], or he is able but does not wish, or he neither wishes nor is able.

If he both wished and was able, he would have taken care of everything; . . . if he wishes and is not able, he is weaker than the cause . . . but it is contrary to the concept of God that he should be weaker than anything. Again, if he is able . . . but does not wish to do so, he will be considered malevolent, and if he neither wishes nor is able, he is both malevolent and weak; but to say that about god is impious. Therefore, God does not take care of the things in the cosmos.

(*Trans.* Benson Mates, Oxford Press).

**Sextus
Empiricus,
skeptic:**

Empiricus (Don't confuse with **Epicurus**, 300 BC) said that only by suspending judgment can one achieve peace of mind. His name gave us *empirical* (based on experiment) He said,

Suspend judgment

“the skeptic may well entertain the belief that God does or does not exist or that virtue is good.

But he will not believe that such claims are true on the basis of reason as, so far as he is aware, no reason for assenting to such claims has yet been shown to be any more credible than the reasons to deny them. So **Empiricus** says the skeptic lives undogmatically in accordance with appearances and also according to a regime which includes the guidance of nature, compulsion of feelings, laws and customs, and instruction in arts and crafts.

The skeptic follows this course of life while suspending judgment concerning the ultimate truth of the non-evident matters debated in philosophy and the sciences. Thus, the Pyrrhonian skeptic is one who believes possibly many things, but yet does not dogmatize about those beliefs since he finds no ultimate justification for them. He also said it was impossible to prove a god existed who does not show himself. This was less than 200 years after **Jesus** and at a time when Christianity was still a minority religion. **Empiricus** posited skeptical arguments against the existence of god(s).

He influenced future skeptics, including **Montaigne, David Hume, and Hegel.**

God needs to show up

**c AD 200
The Trinity.
Husband rules.**

Christianity: **Quintus Septimus Tertullianus / Tertullian** (c160- cAD 225), Carthage, Christian author, was the first to describe the Trinity. He said to women, “your husband is your master”, and that it wasn’t necessary for humans to think as God has done it for them.

Man doesn’t have to think

When the Emperor was persecuting Christians, **Tertullian** wrote an eloquent defense of Christianity for the Roman magistrates. He stressed its ancient Jewish roots. He said that when discoveries in science were at odds with Scripture, Christians should defer to Scripture.

Also he said, “When we come to believe in Christianity, we have no desire to believe anything else.” He was the first to use the phrases “*New Testament*” and “*Old Testament.*”

He also said fossils came from the flood of Noah.

AD 200-300 China: **Hsiung-nu** nomads from Mongolia, called Huns, were driven west, across the vast empty steppes of Central Asia to the Black Sea, forcing the Goths and Vandals living there further west into Europe.

**AD 230
The Bible is Christianity**

Christianity: **Origen** (c.AD 183-c.253), a Greek Christian scholar, said that as God would not abandon his children, Hell was not absolute and all persons would be saved from Hell.

The final *New Testament* has many contradictions. This doesn’t prove that all gospel descriptions of **Jesus’s** life were false, but it suggests it. Formal textual study of the *Bible* began around 1880is. Nonetheless, the *Bible* is Christianity and Christianity is the *Bible*.

**c AD 230
Efforts to make the Bible more sensible.**

Bible interpretation: Scholars have noted contradictions and nonsense in the *Bible*. It contains many concepts that are inconsistent with modern ethical standards and scientific findings.. Many theologians have sought to make sense of its difficult passages. **Origen** said interpret the *Bible’s* genocidal passages lovingly, not literally, that all verses had three meanings, the literal, the moral, and the allegorical / revealed truth, i.e., **Jesus’s** virgin birth represented the birth of divine wisdom in the soul.

Origen: This freedom to interpret embarrassing passages allows clergy great latitude.

Augustine later said the same. Only priests had bibles.

Neo-Platonism melded Christianity and Plato

Neo-Platonism: **Plotinus** (AD 205- AD 270), an Egyptian, tried to reconcile the rational philosophers and the pagan mystery religions. **Plotinus** founded a school of philosophy in Rome that came to be called Neo-Platonism. He said the ultimate goal of mystical union with the good (the source of all being) could be achieved by intense moral and intellectual discipline. Neo-Platonism synthesized **Plato** and other Greek philosophers. **Plato** had said that all reality is caused by a series of emanations from a **divine source**. **Plotinus’s** book, *Enneads*, sought to meld **Aristotle’s cosmological argument** for a first cause and **Plato’s** notions of a great God and the idea of emanation. God emanated the world. .

The most significant religious merger: Christianity and Platonism

This was the single most significant merger of monotheism with philosophy. **Plotinus** made scholars look upon **Plato** and **Aristotle** as being religious. **Plato** had said that people had souls which went to a pleasant place at death. **Plato’s** philosophy fit well with the various emerging Christian beliefs and gave Christianity some intellectual status. **Plato’s** “soul” became Christianity’s soul.

This creation of Neo-Platonism was one of the most important events in the history of both philosophy and religion. Neo-Platonist said that the essence of God could not be known by intellect alone; this only produced opinion and belief.

They posited a third form of knowledge, *gnosis*, appreciation of the divine, that could only be achieved by doing good, experiencing good, use of intellect in self contemplation, and self awareness leading to the *monad*, or *the One*.

Plato and **Plotinus** said the universe was created by God & filled with plants & animals for persons to enjoy.

AD 250 **America, Mayans, Aztecs** The Americas: were totally unknown to the Med civilizations until **Columbus** (1492). Teotihuacan, a city NW of current Mexico City, had a population of c150,000 (fifth largest in the world). Its empire faded c. 500. The Mayans in the Yucatan and Central America, the most advanced civilization in the Americas, began its classical period of large scale construction, monumental inscriptions, and intellectual and artistic development, under a priesthood of mathematical diviners. It lasted until c.900.

Mayan hieroglyphics were not deciphered until the 1990s. The great explorer, **Alexander von Humboldt**, c. 1800. gave the name Aztecs to several cultures around Mexico city. They built the Pyramid of the Sun just north of Mexico City. North and South American natives had numerous gods.

AD 250 **Manichaeism: Mani** (AD 216-274), a Persian, founded Manichaeism, a Christian sect that evolved out of Gnosticism. It believed in good and evil forces, so avoided *The Problem of Suffering/Evil*.

Manichaeism was an elaborate dualistic cosmology describing the struggle between a good, spiritual world of light, and an evil, material world of darkness. Through an ongoing process in the world of light is gradually removed from the world of matter and returned to the world of light.

Mani didn't claim to be divine. He said **Adam, Zoroaster, Gautama, Jesus**, and he were true prophets. Manichaeism flourished for a few centuries and once was the principal rival to the Roman Christian Church.

AD 303 Emperor **Diocletian** (AD 244-313, emperor AD 284-305), issued an *Edict Against Christians*. He ordered all Christian structures to be razed. Christians were forbidden to assemble, their property taken. Christians were tortured. He appointed **Maximilian** as co-emperor to rule over the Western part of the empire.

AD 313 **Epicurean Paradox?** Religion: **Lactantius** (c.AD 250-325), a Roman Christian theologian, in his book, *De ira Dei /The Wrath of God*, said **Epicurus** around 300 BC had expressed what **Lactantius** called the *Epicurean Paradox*, a version of the *Problem of Evil*. **Lactantius's** version of the *Problem of Evil* was almost word for word identical to how **Cicero** phrased the *Problem* in his 45 BC book *de Natura Rerum*.

There's no evidence Epicurus ever said what Lactantius called the Epicurean Paradox While the basic problem was known to the Sumerians and then to the Jews and the Greeks, there is no evidence Epicurus ever said it. To the contrary, when **Epicurus** spoke about a divinity, he spoke about gods, not a God. He also said that the gods were totally indifferent to humans.

He paid them no known attention (See 300 BC **Epicurus**). No surviving writing of **Epicurus** mentions it. Most significantly, nothing like it appears in **Lucretius's** 60 BC *De Rerum Natura*, a long book length poem which detailed **Epicurus's** philosophy. It appears that **Lactantius** got his *Epicurean Paradox* from **Cicero**. (**Cicero's** version was similar to **Carneades** c.150 BC version.

(**Hume's** iteration in 1751 probably came from **Pierre Bayle's** influential *Dictionnaire Historique et Critique*, which quoted **Lactantius**, who probably quoted **Cicero**, who may have quoted **Carneades**.)

Lactantius's answer. "Unless we know evil, we wont be able to know good." **Lactantius** did have his own different answer to the problem. As a Christian, his God was a given. He tried to justify suffering. Like others of the time, he assumed a God (which invalidates anything else he may say) and wrote, "God can do whatever he wishes . . . He could take away evil; but He does not want to . . . because He at the same time gives wisdom . . . and there 's more of goodness and pleasure in wisdom than of annoyance in evils."

"For wisdom causes us even to know God, and by that knowledge to obtain immortality, which is the chief good. Therefore, unless we first know evil, we shall be unable to know good."

Recall, **Aristotle's** logic tells us that of two *contradictory* statements, "at least one is false." (Maybe both) It is clear that suffering most cruelly *does* exist, so logically one or more of the contradictory statements claiming a God that is omnipotent, omniscient, and benevolent is false. **Lactantius** said that sufferings/evil are "annoyances. He has never suffered.

His comparison is meaningless. He compares. Apples and oranges. Suffering is in a different category of concepts as wisdom and judged by different criteria and so cannot logically be compared. **Lactantius** phrased his answer as a "holiness" problem" for an existing God; not as an "existence" problem for a God yet to be proved..

AD 313 **Edict of Milan** Roman Emperor **Constantine** (AD 272- 337, emperor from AD 306-337) in his *Edict of Milan*, resolved that all persons may worship as they wished. His empire had a growing Christian presence and a pagan tradition. He catered to both. He promoted Christianity to help him govern. He wanted to use the bishops as a unifying force for his empire, so he gave the various Christian bishops civil powers. He also saw that they often had seriously differing beliefs and interests. Christian anti-Semitism grew out of the Church's efforts to accommodate Rome. It shifted the blame for **Jesus'** death from the Romans to the Jews.

The Jews did it.

Many Christian sects with different beliefs. Bishops of the largest Christian-Jewish communities, Rome, Athens, Antioch, Byzantium, and Alexandria had different dogmas and tended to exercise authority over bishops of smaller locales. Among early Christian-Jews there were also numerous more or less autonomous sects with different beliefs.

Docetists said that **Jesus's** body was a phantom. Manichaeism said there were two supernatural forces (good and evil). Ebionism said **Jesus** was mortal and Mosaic law / law of **Moses** governed. They thought it unworthy of the son of God to be born a man and to die as a criminal on a cross. The Jewish Essene sects, Gnosticism, and Manichaeism, taught predestination of the elect and non-elect. Gnostics developed in Alexandria and had various sects who claimed superior knowledge.

Sabellians said **Jesus** was one aspect of God, God was creator, Savior, and Comforter. Marcionists said that *The Hebrew Bible* was a work of an imperfect cruel God, so ignore it.

Donatists of Africa were strict moralists who didn't accept the spiritual authority of those clergy who had betrayed Christians during Emperor **Diocletan's** reign and regained power under **Constantine**. They separated from the orthodox on the question of the consecration of a certain bishop, declared that all who adopted the orthodox view must be damned..

Arianism in Egypt and Syria, founded by **Arius**, said that as **Jesus** at one time did not exist, so he was not equal to the Hebrew God; so the Trinity did not then exist.

These differences weakened Christianity. Disputes between the sects actually could become violent. Donatists beat multitudes to death with clubs, blinded others by putting lye in their eyes.

An Arian bishop of Alexandria caused the widow of the Athanasian party to be scourged on the soles of her feet, the holy virgins to be stripped naked, to be flogged with the prickly branches of palm trees or to be slowly scorched over fires till they abhorred their creed.

Rome's bishop was then just one of the many Christian bishops, on the outskirts of the Christian world, all equal in authority over Christians in their area. To prosper, Christians needed coherence in their beliefs.

Constantine merged Christians with Pagans **Constantine** saw the different Christian sects as divisive and destructive for his rule. To govern more effectively, **Constantine** caused Christianity and paganism to merge. The merger was not smooth. The older aristocratic sophisticated pagans, following Greek thinking, said that knowledge came from observation and human reason, contrary to the Christians' belief that knowledge was revealed from God. So Christianity developed what came to be called sacred and profane knowledge.

AD 325 Fed up with the squabbling bishops to whom he had given tax exemptions, **Constantine**, not a Christian, and knowing little of it, convened, presided over, and dominated the *Council of Nicaea* in Anatolia) in order to decide and enforce a common Christian doctrine.

Council of Nicaea **Constantine** invited around 1800 bishops from all Christian lands. Around 300 came. The attendee bishops were almost all Easterners. The bishop of iRome sent an observer.

Council voted Jesus co-equal with the Hebrew God The *Council* "resolved" the *Arian* dispute by voting **Jesus** co-equal and co-eternal with the Hebrew Lord the Father. Arian and non-Trinitarian *beliefs* were deemed false. The *Council* decreed that after ordination priests should not marry. It prohibited clergy from charging interest for a loan (usury) and moved Easter (**Jesus's** resurrection) from Passover, saying Jews had defiled their hands with enormous sin. Easter combined the Jewish Passover with pagan celebrations of a resurrected God. The *Council* largely decided on 21 writings like the *Gospels* and **Paul's epistles** that became the *New Testament*.

Nicene Creed *Nicaea* was the first ecumenical council. It actually "resolved" little. It did produce the *Nicene Creed*, which became the basic set of beliefs of Christians: "I believe in one God . . . Creator of Heaven and Earth and in one Lord, **Jesus** Christ . . . and in the Holy Ghost," plus denunciations of Arianism. (*The Creed* had revisions and revisions. It was finalized at the *Council of Constantinople* in AD 381). Church councils in later centuries firmly confirmed the Holy Ghost as part of the Trinity. All Church councils up to 700 were initiated by the Roman emperor. They were precursors to international law.

Sol Invictus Christianity: *Sol Invictus* / Unconquered Sun, was the pagan god of the Roman Empire. Sunday, the day honoring *Sol Invictus* was made the holy day for Christians. *Sol Invictus's* birthday, just after the winter solstice, Dec. 25, a popular pagan feast of *Saturnalia*, was made **Jesus's** birthday. Most of paganism's rites and festivals were melded into Christianity.. **Constantine** outlawed magic

Peter. **Peter**, an apostle and important Christian-Jew of the first century was now claimed to have been bishop of Rome centuries before, a matter not mentioned in the gospels or epistles or then-contemporary histories.

Christians
went from
persecuted
to
persecutors

The then bishop of Rome claimed ascendancy from **Peter**. Under **Constantine**, Christians went from being a persecuted minority to the dominant political organization, where it could do the persecuting.

The Christian bishops used the political structure of the Roman Empire. Rome thus became more important to Christianity; its dioceses were the administrative divisions of the empire.

Christianity: **Catherine Nivey**, Brit, historian, has authoritatively described in her book, *The Darkening Age, Christian Destruction of the Classical World*, that in the 4th and 5th centuries the Christian Church destroyed classical structures, statues and polytheism/paganism, closed or destroyed pagan temples, closed all pagan libraries, burned huge quantities of books & instituted a climate of fear in non-Christians.

- AD 331 Jesus failed to return as promised, Nonetheless, the Church became a strong earthly political power, it revoked privileges of non-Christian-Jews, like joining the military. It made sex between Jews and Christians a capital offense, at times banning pagan idolatry and sacrifices. From **Constantine** forward, Christian bishops had the same interests as kings and princes in maintaining control of the lower classes.
Jesus's religion thus started with diverse sects, no priests, altars, temples, rites, ceremonies, or pope.

- AD 337 The Roman Empire: **Toynbee**: "After the Greeks and Romans had conquered the world by force of arms, the conquered world took its conquerors captive by converting them to new religions." The Western part of the empire was ruled from Ravenna, but weakening. The Eastern part was ruled from *Nova Roma*.

Constantine: murdered his wife **Fausta**, and his eldest son **Crispus**. On his death in 337, **Constantine** willed the Roman Empire to his three surviving sons. *Nova Roma* was renamed Constantinople, city of **Constantine**. It became the greatest and richest city in the West for c.1,000 years. But corruption and quarrels in the Church and the government weakened the empire. Germanic peoples and Goths (ref c.AD 200-300) moved into the outlying parts of the empire.

- AD 355 Differing dogmas: **Hilary**, Bishop of Poitiers and a "Doctor" of the Church, said, "It is equally deplorable and dangerous that there are doctrines as inclinations, as many sources of blasphemy as there are faults among us, because we make creeds arbitrarily and defend them arbitrarily. Every year, nay every moon, we make new creeds." **Augustine** (AD 413) said there were 83 different Christian sects.
He reconciled the Bible's creation contradictions. Said both versions happened in a moment.

- AD 363 Christianity: **Julian**, a general under **Constantine**, posed the *Small God* problem. "Why did God, claimed to be a universal God, neglect people for thousands of years only to preach to Jews, a small tribe, when the Greeks outshone the Jews in every way?" He also said, "Do not the deep disputes among Christians disprove their claim to have found the truth?" This is the *Problem of Contrariety*. (p. 406-7)

- AD 370 Christianity: **Basil**, bishop of Caesarea and a "Doctor" of the Church, said, "The bread you hide belongs to the hungry; the cloak in your chest to the naked, the gold you have hidden to the poor." He denigrated reason, "Let us Christians prefer the simplicity of our faith to the demonstrations of human reason. The nature of God is a mystery. It is enough to know there is a good shepherd who gave his soul for his sheep."

- AD 374 Christianity: Emperor **Valentinian** (AD 321-375), baptized and named **Ambrose** (c AD 340-397), a civil magistrate, as Bishop of Milan. **Ambrose** promoted the Church's independence from the influence of the emperor. **Ambrose** rejected scientific inquiry as it did not assist in salvation. He reconciled the Bible's creation contradictions saying the light of day is one thing and the light of the sun, moon and stars is another. There's light before the sun rises and then the sun "adds further to its splendor."

Ambrose told **Augustine** that the "gross" passages in the *Old Testament* were allegories.

Ambrose disdained the rich, "How far, oh rich, do you extend your senseless avarice. Do you intend to be the sole inhabitants of the earth? Why do you drive out the fellow sharers of nature, and claim it all for yourselves? The earth was made for all, rich and poor, in common. Why do you rich claim it as your exclusive right?" **Ambrose** was later deemed a saint and a Doctor of the Church. The concept of "saint" developed slowly.

- Heresies** Christian fear of knowledge: **Philastrus**, bishop of Brescia, Northern Italy, compiled a list of heresies. Said, "There is a certain heresy concerning earthquakes, that they come not from God's command. Heretics presume to attribute the motions of force to the elements of nature . . . like certain foolish philosophers who, ascribing this to nature, know not the power of God. But, it is thought, from the very nature of the elements paying no attention to God's power."

- AD 381-82 Emperor **Theodosius** made Christianity Rome's official religion, decreed all Roman subjects Christians. The Second Ecumenical Council held in Constantinople reaffirmed and strengthened public belief in

The Trinity
developed.

The New Testament finalized.

Jesus's co-equality with the Hebrew God and said the Holy Ghost was also fully God even though there was little biblical support for the concept of the Trinity. It has been fiercely debated in detail ever since. The bishop / patriarch of Constantinople was given authority over Asia Minor and the Balkans. The *Nicene Creed* was finalized. The books of the *New Testament* were agreed upon. (more **Theodosius** AD 392)

AD 382 The Bishop of Rome (not yet considered a pope) **Damascus**, (305-384) commissioned **Jerome** (AD 347-420) a widely traveled priest to translate the *Bible* into Latin. He did so from its original Hebrew and Greek. **Jerome** believed in the doctrine of hell, His translation became known as the *Vulgate*. **Jerome Bible** translated several key Hebrew and Greek words into Latin favorable to the Christian doctrine of hell.

The Vulgate is now the official Catholic Bible. **Jerome** urged the ladies of the bishop of Rome's court to adopt an ascetic life, angering the bishop. He said that God's wrath against sin caused mountains and uneven terrain. He came to be called a saint, like many early Christian leaders. (Formal canonization of saints began only c.1200.) Like **Tertullian** (c. AD 200), he disparaged marriage. (More *Vulgate* 1382)

c.AD 385 **Christianity:** Bishop **Gregory** of Nazianzus said the war between two bishops in Cappadocia was not about souls but was about control of taxes and contributions. **Gregory** ended the theological debate about the nature of God by declaring God unknowable. So speculation about his nature was futile.

AD 386 **Women are not smart enough to be priests** **Christianity:** Archbishop of Constantinople **John Chrysostom** had criticized those who speculated about God as it was faith / belief that mattered. He opposed slavery and child prostitution. He deposed bishops who had bought their offices, said laughter led to sin. Also, "Restrain our own reasoning, .. empty our mind of secular learning . . . to provide a mind [to receive] divine words." He called women "a necessary evil," said women weren't smart enough to be priests. He said that "a comprehended God is no God."

Vitriolic anti-Semite **Chrysostom** was vitriolic against Jews, "lecherous, greedy, rapacious, odious assassins of Christ. All Christians must hate Jews." Jews couldn't hold office, serve in the army, proselytize, or marry Christians. Anti-Semites quote him still. Nazi defendants at the Nuremberg war trials after WW2 quoted him.

Priests copied Egyptian priests' costumes **Christianity:** **Augustine** became a Christian. The Church became more institutionalized: A school for priests grew up in Alexandria. Priests began to wear the costumes of Egyptian priests, used mitres, tiaras, sprinkled holy water, used wine, perfume, candles and gold and silver vases, burned incense. **Spinoza:** (1670) "Immense efforts have been made to invest religion, true or false, with such pomp and ceremony that it can sustain any shock and constantly evoke the deepest reverence in all its worshipers." Roman **Ammianus Marcellinus** ridiculed the bishops in Rome, "Enriched by the gifts of matrons, they ride in carriages, dress splendidly, and outdo kings in the lavishness of their table."

Clergy allied with the wealthy By the 4th century, Christianity had spread throughout the empire as a priestly religion, familiar to older ones. Ceremonies became more ornate. The Church became allied with wealth, conservatism, and the traditional structures of society. The Church told slaves to be obedient and work hard for their masters. *Titus* 2:9, *Eph.* 6:5-7. Monks who found escaped slaves seeking refuge in their monasteries returned them to their masters. Slaves couldn't become priests.

AD 392 **Church State relations:** In 390, **Ambrose** (ref AD 374) , now Bishop of Milan, "excommunicated" emperor **Theodosius** for massacring 7,000 people in Salonika, Greece. He reinstated him after several months of penance. He was as important as Paul and Constantine in making Christianity the dominant Western religion.

The Empire and Church split into East and West

Purging dissidents: Between AD 389–392 he promulgated the "*Theodosian decrees*" which removed non-Nicene Christians from church office and abolished the last remaining expressions of the Roman pagan religion by making its holidays into workdays, banned blood sacrifices, closed Roman temples, confiscated temple endowments and disbanded the Vestal Virgins. Witchcraft was punished.

Theodosius declared Christians who did not obey the *Nicene Creed* were heretics and will be divinely condemned and punished by him. When he died AD 395, the empire split between Constantinople and Rome. He was the last emperor of both Eastern and Western parts. Bishops had civil administrative and judicial duties. In AD 399, he outlawed pagan sacrifices or attending pagan temples.

Decline & Fall of Rome Europe Stagnated in Theocracy Feudalism Islam

c.400 **Decline and Fall of the Roman Empire.** Overview, distrust of knowledge: Romans had no interest in science, nor did Christians. **Gregory**, Bishop of Nyssa, said, "The human voice was fashioned for one reason alone - to be the threshold through which the sentiments of the heart, inspired by the Holy Spirit, might be translated clearly into the Word itself."

Schuman (1532): "The Roman World State was a military despotism imposed on a corrupt plutocracy. Its masses of slaves, tenant farmers, and urban proletarians were more interested in bread and circuses than in any loyalty to a cause or any devotion to a mission. Even by its own standards its ruling class was dishonest, grasping, and irresponsible." The Western Roman part of the Christian empire "declined and fell."

bread and circuses Rome was nominally Christian, but mostly pagan and corrupt. Citizens of Rome were devoted to consumption, while the great mass of people in the empire, including barbarians, lived miserably. The Western empire's wealth (and grain) was shipped to Rome. The Eastern part, including Greece, under Constantinople, did not decline like the Western part. Rome was weakened by Arab pressure from the South, wars with Persia, and oblivious to the growing threat from the barbarians from the north.

c 410 Goths and Vandals, forced out of Central Asia by the Huns, spread into Europe. Visigoths, a subset of Goths, had moved into the Roman Empire beginning in AD 376. In defense, the Romans fortified Emperor **Hadrian's** (AD 76-138) Tomb, across the Tiber from the Vatican. In 410, under **Alaric**, Visigoths went south and sacked the then weak Rome. They were paid off and withdrew. While not a decisive military victory, it was important symbolically, and was a symbol of the decline of Pax Romana that had unified much of Europe and the Med. As barbarians migrated into the empire, there was no popular uprising. The empire disintegrated, the Roman army shrank. The Roman emperors then in Ravenna were helpless.

Dark Ages With the fall of Rome, the *Dark Ages* of Western civilization began. It lasted until c1,000. Roman legions withdrew from Britain. Western civilization collapsed, causing misery and suffering everywhere in the West. Over the 500 years of the *Dark Ages*, the sum of human knowledge in the West shrank.

Why did Rome fall Rome's fall was the dominant historical event of Europe. Historians have theorized why it fell. **Toynbee:** "schism in the body social," internal divisions that undermined Rome's unity at the core. **Will and Ariel Durant:** Rome's morals, wars, taxes, bureaucrats, class struggles, and its falling trade.

H G Wells **H G Wells:** There was no free mental activity, no organization to develop knowledge. Romans venerated wealth, despised science, The rich ruled. It was colossally ignorant and unimaginative.

The Decline and Fall of the Roman Empire **Edward Gibbon**, in his book, *The History of the Decline and Fall of the Roman Empire* (1776), wrote, "After a long analysis I can discern four principal causes for the ruin of Rome which lasted over more than one thousand years. 1. The injuries of time and nature. 2. The hostile attacks of the Christians and barbarians. 3. The use and misuse of the materials. And 4. The domestic quarrels of the Romans."

Closing of the Western Mind **Charles Freeman** wrote that the fall of Rome was "*The Closing of the Western Mind*" (2003). Greek rational thinking was stifled by the political and Christian forces of the Roman empire. Faith replaced reason. Romans, pagans or Christians, had little interest in science. **Freeman** said that the Church became politicized and more business-like, rejecting **Aristotle's** rationality.

The Church disparaged Science Natural philosophy was disparaged. Hell and salvation dominated men's minds. **Ambrose** said, "To discuss the nature and position of the earth does not help us in our hope of a life to come." **Tertullian:** "Curiosity for us is no longer necessary." Rome's cardinal virtues of wisdom, courage, moderation, and justice were replaced by faith, hope, and charity. The Church took over the empire culturally and politically. Christianity was largely an urban religion. *Canon Law* replaced the *Justinian Code*. Scientific thinking in Christianity was negligible until **Aquinas** (1273).

Saint Augustine, **Augustinus / St. Augustine:** (AD 354- 430), the first of the two great Christian theologians (he and **Aquinas**), a Doctor of the Church, was a Berber (a North African ethnic group ranging in appearance from Negroid to Caucasian), born in present

- first of the two great Christian theologians (he and Aquinas)** Algeria, who at first had rejected the anti-rational mysticism and intellectual confusions of Christianity, had a mistress and child. ("God, give me chastity and continence, but not yet.") He then became a famous *Manichaen* (two forces, good and evil) teacher for nine years. He read **Virgil's Aeneid**. He read **Plotinus** (ref AD 230), and became devoted to Neo-Platonism. He heard **Ambrose** (ref. AD 374) preach, gave up his mistress and child, converted to Christianity, primarily as he believed that **Jesus** performed miracles.
- Confessions** He became a Christian priest in AD 391 and was elected Bishop of Hippo (Algeria) in AD 396. He wrote hundreds of letters/sermons denouncing Manicheans, Donatists, Pelagians, and Arians as heretics. He wrote *Confessions*, (consisting of ten chapters about himself and three about scripture) It was the first ever self conscious autobiography the first to use the word "I" in its modern meaning.
- AD 413-426 **Augustine** Christianity defined and defended: **Augustine** completed the first part of *De civitate Dei /The City of God* (22 volumes), the most elegant defense of Christianity of the time. He was familiar with Roman and Greek pagan literature and saw how it contradicted Christian scripture. *City of God* answered the Roman pagan charge that Christianity could be blamed for the Visigoths' 410 sack of Rome. He finished it in 426. He sought to win over those cultivated pagans not satisfied with pagan polytheism. He told the pagans that polytheism was not conducive to mortal happiness. He said that "the essential nature of man is will, and no man wills the true God to be God unless he is touched by divine grace. Said, "I believe so that I may understand. Theology is faith seeking understanding."
- City of God, 22 volumes.**
- One can't know what God is.** **Augustine** said, "We can know what God is not, but we cannot know what He is." He wrote, "*Si comprehendis, non est Deus.*" If you can understand it, it is not God." He said history is divided into two cities formed by alternate forces; the earthly city of the love of self, and the heavenly city, formed by the love of God. Sin was a defect of character which one couldn't escape unaided."
- City of God** *City of God* also laid out a plan of world history of two cities in eternal conflict, the City of Man, material, fleshy, wretched, selfish, downward turning, "Cursed is everyone who places his hope in Man." And the *City of God*, spiritual, turning upward. It is within the heart and soul of every true Christian, and cannot ever be conquered. Earthly power could never compare to the glory of the spiritual inner city, which could exist in a beggar as well as a holy man. Rome could die but God's city wouldn't. **Augustine** confirmed and emphasized that vegetables and animals were cursed due to Adam's sin.
- AD 413 He said that one can force a person to enter a church, to approach the altar, to receive the sacrament; but you cannot force them to believe . . . No one can find salvation except in the Church. Outside the Church one can find everything except salvation.
- Science is a threat to Faith** He advocated unquestioning acceptance of faith, believed that science was a threat to true faith. "For the Christian, it is enough to believe that the cause of all things, in Heaven or Earth, whether visible or invisible, is only the goodness of the Creator. We are too weak to know the truth by reason alone."
- In *City of God, Book 11*, **Augustine** wrote *Si fallor, sum* (I am quite certain that I am . . . If mistaken, I exist, for one who does not exist can surely not be mistaken either, and if I am mistaken, therefore I exist). This is similar to *Cogito, ergo sum*, **Descartes's** famous phrase of 1200 years later). **Augustine** made science antagonistic to religion. He made the works of the Greek philosophers profane.
- Bible** He made the *Bible* the arbiter of human knowledge, not just a guide to human behavior, i.e., if natural philosophy and the *Bible* differed, the *Bible* prevails. He said, "He that is good is free, though he is a slave; he that is evil is a slave though he be a king." This destroys the idea that words have meanings.
- AD 413 **Augustine** argued that it is the very irrationality of the Christian message that is its strength.
- All babies who die unbaptized deserve to burn in Hell** *Original Sin*: Augustine expanded and refined Paul's concept of Adam's sin. Said that Adam's disobedience was so serious that it transmitted to all humans to come a sin and an inclination to sin so all humans becoming a "mass of perdition" with enfeebled but not destroyed, freedom of will.
- When Adam sinned, human nature was forever transformed. He said revelation overruled logic as *Original Sin* diminished Man's ability to think freely. Plus all plants and animals were cursed due to Adam's sin. Baptism takes away the *Original Sin* but does not take away the inclination to sin. So all humans are sinners as they were born with Adam's *Sin*, if they die unbaptized they will go to Hell.

Original sin	His exposition of <i>Original Sin</i> may have been a result of his using a Latin translation of Paul's Epistle to the Romans , as in the original Greek, he would have seen that the sin that entered the world as a result of Adam's eating the fruit was a "cosmic" force burdening all humanity rather than just unbaptized ones.
Adam's sin dimmed all men's minds forever	Augustine said that <i>Original Sin</i> was not an act but a <i>state of being</i> inherited at birth which one inherits. It is so deep in Man's nature that good deeds can't wash it away. So humans are doomed to physical death and eternal torture in Hell, unless they are saved by God's merciful grace, which God may grant or not. This makes <i>free will</i> regarding sin and salvation an illusion. He said that God created a perfect world of everything physical and spiritual and gave persons the great gift of <i>free will</i>, but knew that they, Adam and Eve would turn away from God, thus causing sin and evil to come to the world. Early in his career he accepted the <i>free will defense to the Problem of Suffering / Evil</i>, but he began to realize that his concept of <i>Original Sin</i> negated man's <i>free will</i>. So he became the Church's first important critic of the <i>free will</i> defense.
Humans are depraved	Augustine, "As sinners, humans are utterly depraved, lack the freedom to do good, and cannot respond to the will of God without divine grace. He asserted that God had foreordained from eternity those who would be saved. People can escape from sin only if God decides to give them grace, which is given only to the "elect." So, God created some persons predestined to eternal torture. Calvin had the same idea in 1536.
413-426 Original Sin	Augustine said, "As all humans were seminally present in Adam, all humans bear the guilt of his sin. Man's power to think rationally had been corrupted forever by Adam's sin. Christ's agony on the cross only makes sense in the context of Man's sinfulness; if Christ brings salvation, people needed salvation, contrary to the classical view of them. Thus Christianity split from classical rationalism. Augustine also justified slavery as the result of Adam's <i>Original Sin</i>. He said slavery "exists only by the judgment of God, in whose eyes it is no crime."
Pelagius objected	<u>Original sin criticized</u>: Pelagius, a Welsh cleric, criticized Augustine's harsh concept of <i>Original Sin</i>; said that when persons choose to be good or evil the good persons will go to Heaven. Many theologians agreed. The controversy caused Augustine to reinterpret the teachings of Paul, arguing that faith is a gift from God rather than something humans can choose. The <i>Bible</i> said that evil was the result of man's sinning. When one sins, God will visit evil on that person. He said that while persons had a propensity to sin, they also had the capacity to choose good. Augustine had Pelagius excommunicated and his ideas declared heretical.
Pelagius: Suffering is retribution	Pelagius also answered <i>The Problem of Suffering/Evil</i>. Like Lactantius (ref AD 313), Pelagius assumed God existed and addressed "evil." He said that evil was the direct result of man's sinning as <i>Suffering</i> is retribution for disobeying God. If many people sin, widespread disaster will follow. This concept is in the <i>Hebrew Bible</i>. (But natural disasters cause pointless suffering to innocents as well as to sinners.)
Julian also objected	Bishop Julian of Eclanum also challenged Augustine, "Who sends the innocent to punishment? You answer, God, who commands his love to us and handed over his son to us. He persecutes new born children, He hands over babies to eternal flames . . . when He knows they have not so much formed a will."The Greek speaking Eastern Christian sects ruled from Constantinople did not accept <i>Original Sin</i>.
Augustine 413-426	Christianity was now the dominant Western ideology. Augustine said, "Nothing is to be accepted except on the authority of Scripture. As greater is that authority than all the powers of Man's mind." In <i>Soliloquium</i>, he said, "Necessity knows no law." (This is a common comment in history.) Christians must renounce earthly glory and be willing to live in small isolated places where the glory of the Heavenly City could more easily be seen. Give yourself to God and God will give you eternal peace.
The goal of Christians, Salvation	The goal of Christians was salvation in another life, to be with and love God, not of this world. Study of nature was futile due to the impending end of the world. So belief in and worship of an omniscient, benevolent, omnipotent, and unknowable creator God became the central tenet of Christian theism. Augustine said, 1. There is unity in truth. 2. God reveals Himself through Scripture and Nature. 3. Scripture requires interpretation, and 4. Religion trumps science. Augustine argued that although <u>Christian doctrines could not be justified by reason</u>, they should not be rejected as there were many marvels in the world that could not be rationally explained, such as peacock meat that did not rot and mares in Cappadocia that were impregnated by the wind.

413-426 **Origin of the soul** Like **Plato**, **Augustine** said that Universals (abstract words) were the true reality.

He was uncertain about the concept of souls, "I have not been able to discover in the accepted books of *Scripture* anything at all certain about the origin of the soul."

Heresy: Beat heretics to death **Fear of Dissent:** The Church defined *heresy* as "a teaching, an idea, directly contrary to a truth revealed by God or a truth propounded by the Church." **Augustine** said that torture was fitting for those who broke the laws of God. Heretics should be examined by beating them to death. Witchcraft was a supernatural belief system that competed with Christianity's supernatural belief system. So, believing in witchcraft was heresy. The **Hammurabi Code**, Roman law, and Jewish law all believed in witchcraft and outlawed it.

A "just" war *City of God* argued that the early Christian pacifism was an idealism meant only for the *City of God*, but Christians could wage war under certain conditions. *City of God* gave the first Christian justification of a "just war" that became the basis for all future discussion of the topic.

413-26 **Men rule women. Jews to wander the world** **Male superiority:** **Augustine** disrespected women. In *De Genesi*, he said, "Men to rule, woman to obey." "I don't see what use woman can be to man." He preached hundreds of sermons in which he never mentioned **Mary**. He disfavored priests to have wives or concubines. _ *City of God*, 18:46, rejoiced that the Jews "were doomed to wander the world." Their plight was proof that **Jesus** was the Messiah. **Diseases:** **Augustine** said, "All diseases of Christians are to be ascribed to demons.

Geography: **Augustine** said that the Earth could not be a sphere as it was not mentioned in the Bible and because "In the day of judgment, men on the other side of a globe could not see the Lord descending through the air." It was not until the 13th century that a flat earth was challenged in Christian universities in Oxford and Paris and by the rediscovered teachings of **Aristotle**.

Greeks had found joy and beauty in the every-day world. Christians found it in the next life.

Omniscience (1John 3:20): In *City of God* **Augustine** said, "To confess that God exists, and at the same time to deny that He has foreknowledge of future things, is the most manifest folly." The essential of humans is will and no one wills the true God unless one is touched by Divine Grace.

413 **Obey, Obey** **Relationship with civil government:** **Augustine** expected Christians to participate in civic affairs and respect authority, even if given an unjust order to kill. Hierarchy of authority was the unquestioned order of things, in Church, state or the family. The Christian must accept the world, not try to better it. [This is a nice dogma for a king.] "Life on Earth will always be mired in sin."

Narrow minded **Epistemology:** **Augustine** accepted knowledge from scientists only if it led to an understanding of Scripture. He said, "The greatest good is wisdom." Latin became Christianity's language.

F W Farrar: "**Augustine's** Saviour was not the Saviour of the world. He was only the Saviour of the Church, and in the Church itself, of only a mere handful of the elect, whom he saves only under strictly ecclesiastical conditions." The Church stopped election of bishops, only clergy could select bishops.

413 According to the Bible, God is absolutely omnipotent. *Gen. 1-27, Deut. 32-39, Amos 4:13, Daniel 2:21, Col. 1:16-17, Isaiah 44: 24, Isaiah 45:17, 1John 3-20.* But, **Augustine Clement of Alexandria, and later Aquinas**, and all saw the potential contradictions in claiming such absolute omnipotence.

So, to make it easier to preserve the claim that God is omnipotent, **Augustine** said God's "omnipotence" meant just "God *could do anything he wished.*" **Aquinas** said God's "omnipotence" only meant God could do things that were "logically possible." (Miracles? Creation?)

Fallen angels cause natural evils **Augustine** considered the problem as a problem of evil, so he said natural evils (disease, plagues, etc.) were caused by evil fallen angels. Natural evils are not a problem when the problem is considered a problem of suffering, not evil. **Augustine** said that God created the world and that it was good; evil is a consequence of the fall of man (*Original Sin*).

Further, that suffering caused by humans is due to man. That is, Adam, having become estranged from God chose to deviate from God's chosen path. **Luther** and **Calvin** said the same.

Answer to the Problem of Evil. Evil isn't a thing. It's a lack of **Augustine** argued that God could not have created evil in the world, as He created it good, and that all notions of evil are simply a deviation or privation of goodness. Evil itself is not an existing moral force – rather it is a corruption of God's good creation. God created the universe *ex nihilo* – and as God is good he would not have created evil directly. Therefore no cause for it could be found. *City of God* 12, 7. Everything that He created began as good. It was all in harmony with God.

something good. In other words, he answered the *Problem of Evil* by defining “evil” so that it did not exist. He actually did say that disease is not an evil, but is merely a lack or privation of health.

Augustine also expressed a “man-has-limited-ability” argument. What appears to be evil seen in isolation could be a necessary component when seen in a larger context. It provides a contrast so that a good could stand out more brightly and perfectly, like ugliness stands to beauty.

Augustine free will defense **Augustine** said that God allows evil and suffering to exist as it is a result of free will – and its abuse by angels and humans. In his *Confessions*, he said, “It was obvious to me that things which are liable to corruption are good. If there were no good in them there would be nothing capable of corruption.”

Erasmus (1511) and **Pierre Bayle** (1697) have argued that if God gave people *free will* knowing they will sin, then God shares responsibility for their evil acts. **Augustine** seems to want to credit God for giving persons *free will*, but not accept responsibility for its foreseeable evil consequences.

AD 414 **Other logical “God problems”** Omnipotence paradoxes: The *Bible*’s God and the *Qur’an*’s Allah are, at a minimum, benevolent, omnipotent, and omniscient, i.e., perfect. *Luke 1:37, Matt. 19:26, 1 John 3:20, Philippians 4:13, Job 43: Jeremiah 1:12*. Besides the *Problem of Suffering / Evil*, There are other paradoxes based on contradictions among a perfect God’s claimed attributes. These paradoxes are also called *God vs. the World Paradoxes*.

The problem of claiming omnipotence The famous example: Can God make a stone so heavy He couldn’t lift it? (Either a yes or a no answer negates His omnipotence. Or, could God create a wall he could not climb? Or, could God create a puzzle he couldn’t solve? Or, Could God create a being more powerful than himself? Or, could God make a person with *free will* love him?)

Omnipotence paradoxes Or, as God created Heaven, where everything is peace and harmony and without suffering, can people there have *free will* to cause suffering? Can an omniscient God know the future but change it? If He can’t change it; he isn’t omnipotent. Is God’s omniscience reconcilable with free will? i.e, if God knows everyone’s future, do people have the free will God gave him? (A concept, *compatibilism*, was devised to handle this. It asserts free will and determinism can co-exist.) Can God deny his own existence? (**Pseudo Dionysus**, 500). Can God lie? Can God be loving and still be the brutal God of the *Old Testament*? Can God be both loving and just? A loving God forgives sin, but a just God punishes sin.

The Bible was written for primitive people. To excuse the Bible’s errors, **Augustine** said it had been written for the limited understanding of the primitive people who were its original audience. **Augustine** said that anything “in the *Bible* that cannot be related to good morals or the true faith should be taken as *allegorical*.”

This need to “interpret” passages purportedly inspired by an omniscient God seems inconsistent with his omniscience. By *interpreting the Bible*, **Augustine** could be called the father of theology. Christian theologians since **Augustine** have been *interpreting the Bible* ever since.

Study the world, BUT curiosity is a disease. Theology: **Augustine’s** several arguments to exonerate God from any charge of moral imperfection became the foundation of *theological optimism*. He said that as God had created the natural world “out of nothing,” studying it could only be good and lead to a greater appreciation of God’s wisdom.

Believe first. Then you understand. **Augustine** said, But, “There is another form of temptation, even more fraught with danger, the disease of curiosity. Curiosity drives us to try and discover those secrets of nature, which are beyond our understanding, which can avail us nothing and which one should not wish to learn. “Seek not to understand that you may believe, but *believe* that you may understand.”

The City of God’s defense of Christian philosophy of history dominated Western thought for c.1,000 years and greatly shaped Western Civilization. He was the greatest Christian scholar since St. **Paul**. He synthesized Greek philosophical thought and Christian belief, thus creating theological systems basic to Christianity. *City of God* became the foundation document of Christian political thought, even though its view of society differed from that of the *Gospels*.

How Christianity dominated: **Gibbon** gave five causes how Christianity became the dominate religion. 1. The zeal of Christians, 2 the promise of heaven. 3. the miraculous powers claimed for the religion. 4. The pure and austere morals of Christian. 5. the discipline of Christians.

Seven Education: Carthage Proconsul **Martianus Capella** compiled a curriculum of the seven

liberal arts liberal arts, rhetoric, dialectic, grammar, geometry, music, arithmetic, and astronomy.
It was the standard reference for Western education for the next six centuries.

415 Murder in the name of God: Historian **Damascus** wrote that **Cyril**, bishop of Alexandria ordered Jews out of Alexandria and told his Christian monks to murder **Hypatia** (c.360-415), a pagan, a famous scholar in math, philosophy, astronomy, and head of the NeoPlatonist school, which had some Christian students. They stripped her, stoned her, and burned her remains. After her murder, many scholars left Alexandria. Its intellectual prominence declined. **Cyril** also drove Jews out of Alexandria. He was later named a saint.

416 Barbarians took over much of Spain. Rome paid Visigoths to defeat them. Visigoths installed a good legal system, reestablished Roman control, became Christians, and began a large program of church building. Barbarians took over Rome's northern European lands. Other Goths advanced into Gaul/France.

c.430 **Christianity reached Ireland.** Christianity, St. Patrick: The first Christian to denounce slavery was St. **Patrick**. He had actually been a teenage slave in Ireland. He had escaped and found his way back to His English birthplace. He became a Christian cleric and returned to Ireland probably in 432 as a Christian apostle and bishop. He walked around the country converting the pagans there to a kind of Christianity that incorporated various pagan customs and was receptive to intellectual ideas.

St. Patrick preached a more tolerant kind of Christianity With **Patrick's** Christianity, the Irish kept their identity. They were used to fighting each other. **Patrick** taught that fighting was only for a very important cause. They continued their pagan customs and feasts, like Halloween and May Day. A husband or wife could walk out on a marriage on February 1, the feast of Imbold. Their evil pagan gods became objects of ridicule.

Ireland is the only land that became Christian without bloodshed.

Freud later said that the Irish were the only people who could not be helped by psychoanalysis.

431 The Third Ecumenical Council at Ephesus, affirmed **Mary's** divinity. As pagans became Christians, a sect of the Virgin **Mary** evolved from the idea of the pagan goddess Diana of the Ephesians.

c.450- c.1,000 Vandals from Asia roamed Europe, fighting as mounted archers, with short composite bows. Rome dwindled from one million (c.25% slaves) to 50,000. **Attila** for a time ruled from the Rhine to Central Asia. Those that could fled from the Goths and the Vandals. Some settled in far off Ireland establishing centers of learning there. **Attila** invaded Gaul, was defeated at Chalons (N. E. France) and retreated.

No news, no schools, no maps, no travel Europe was a wasteland: There were few roads, no maps, no schools. Libraries and books gone. No news, little government, no travel, scholarship stagnated, less farmland, fewer farm animals, constant danger from marauders, little money, commerce was by barter.

Churches were the only source of information. Early Christian ascetics / hermits, first living alone, in time banded together and formed communities, which became monasteries. They copied Greek and Latin texts, but had no use of them. They studied only dogma.

Aristotle's and other Greek works disappeared as few spoke Greek. Scholars died off. Greece itself was ruled from Constantinople far to the east. Local dialects were not understood 100 miles away.

In reality, for most people, i.e., peasants / serfs, the vast majority of humanity, the *Dark Ages* were not much different from any other time. They continued to live in poverty, hunger, danger, superstition, and privation, illiterate, ignorant even of the next village.

The magic of the church was the center of their thinking. Any "knowledge" came from God.

Christianity emerged as the only cohesive force in the West The early Medieval civilization after the fall of the Roman empire resulted from the mixing of the German princes who moved from Scandinavia into the West, the Greco-Roman legacy, and the most important, the Church. As Christianity was the only surviving remnant of the Roman empire, it preserved of a tradition of the defunct imperial tradition. The Church slowly achieved increasing influence, at times more powerful than any king or emperor. Greek rationality was gone.

c.450 While Jesus had appealed to the poor, the bishops became rich from fees, bequests, and taxes. There was no pope yet. All bishops were of equal rank. Whatever their rivalries, the local rulers were at least nominally Christian. The Church replaced the Roman empire as the unifying element of Europe. It controlled the arts, education, and the language, Latin, but most importantly, salvation.

Theocracy, Dogma After the barbarians destroyed Rome, Christians began to see more value in **Augustine's City of God**. Christians looked inward, and cared about their souls. Poverty became the measure of a Christian.

ruled
human
thinking

As saving one's soul was all important, and the world would soon end, the study of natural philosophy was unnecessary and futile. Dogma dominated Man's thought in the Christian West for c.1,000 years.

The only educated people in the West who contributed to intellectual life were those clergymen who were literate. Scientific inquiry in Christendom was rare. Jews were God-obsessed like the Christians.

Pagan
practices
adopted
by the
Church

As directed by **Constantine**, the early Church grew by merging its dogma with the pagan myths and customs of its local pagan converts, including the pagan concept of a goddess, which became **Mary**.

Certain pagan fertility rites became Church feasts and festivals. In Germanic lands, the tribal chief was also the religious chief, and upon converting to Christianity, became bishop of the Church in his territory. Some such chiefs evolved into kings and claimed the right to, *inter alia*, appoint bishops.

The nominal emperor of all Christian lands ruled in splendor from Constantinople, the largest and richest city in the West. The Eastern part, Constantinople, and China, were less affected by Rome's collapse.

Heresy,
Cathars
c.450-
c.1000

Christianity: Christianity prevalent over Europe. Differing Christian sects proliferated in Italy, the Rhineland, Flanders, and France, all more or less associated with *Manichaeism*. They had a purified spirituality, declared that the soul (created by God) was a prisoner of the body (which had been created by Satan).

Thus, the genuinely spiritual abstained from sex. The less spiritual simply cursed marriage. *Catharism* (the Pure) in Southern France was the most powerful / widespread of these "heresies".

Eastern
civilizations
were more
advanced,
were not
affected by
the West's
decline

Non-Western civilizations: China, Turkey, Iran, Afghanistan were more advanced than the collapsed Roman lands. One Chinese emperor's library had 50,000 volumes. Chinese were aware of how blood circulated, had modern stirrups, steel from cast iron, windmills to pump water, their ships had bulkheads.

Aryabhata, a Hindu polymath, said π , pi was 3.1416, a year was 365.36 days, the Earth rotated and orbited the Sun. Perhaps due to Christian aversion to zero, Babylonians had a place value system 2,000 years before Europe did, but without a zero. In all communities, violent death was common. In America, Mayans stripped bark from fig trees to make paper. Europeans did so several centuries later.

451 Dogma: **Leo**, bishop of Rome from 440-461 was forceful and determined to increase the authority of his Roman bishopric over other Western bishops. He convinced the *Council of Chalcedon* (451) to adopt his *Tome*, which described the two natures of Christ, one human and one divine, as one.

In 452, He personally confronted **Attila** who was ravaging Northern Italy after his defeat at Chalons. **Attila** withdrew, probably from lack of supplies. **Leo** took credit. The Latin *papa* and the Greek *pappas* (father) were used to refer to all Italian and Greek Christian bishops, not just Rome's bishop.

476 **Odoacer**, the barbarian chief became ruler of Italy. **Gibbon** said that's when the Roman empire ended.

493 **Odoacer** died and Ostrogoths under **Theodoric** took Ravenna (on the Adriatic between Rome and Venice) deposing the last Roman emperor and conquering most of Italy. Barbarian Huns, Ostrogoths, and Vandals settled in Roman provinces and were gradually absorbed into the local cultures and the Church.

Gold, which Rome paid as tribute to the barbarians, gradually filtered back to the merchants in Rome, who sold goods that the barbarians grew to like. Germanic Anglo-Saxons took over Britain.

c.497 **Clovis**, king of the Franks, adopted Christianity. He and his sons made Franks the most powerful of all the barbarian successors of Rome for three centuries. With the emperor absent, the bishop of Rome ruled.

c.500 Christianity: **Pseudo-Dionysius**, a monk using **Dionysius's** name, wrote *The Names of God*. Said that God cannot be comprehended by finite Man's understanding. Only the truth of faith from God matters.

Original
Sin
applied to
fetuses

Original Sin: Saint **Fulgentius**, bishop of Ruspe (Tunisia), added unbaptized fetuses to those condemned to Hell because of Adam's *Original sin*. He said, "little children who have begun to live in their mother's womb and have there died or who, having just become born have passed away from the world without the sacrament of holy baptism must be punished by the eternal torture of undying fire."

This added to the gross cruelty of *Original Sin* and was a serious disgrace for Christian theologians.

As far as
you are
able, join
faith to
reason

524 Christianity, The Problem of Suffering: **Anicus Boethius** (c.480-524), Roman, wrote his Platonist manifesto, *The Consolation of Philosophy*. Said, "If God is, whence come so many evils? [i. e., the *Problem of Suffering / Evil*]. If God is not, whence cometh any good? " His answer? God wasn't omnipotent.

For him, philosophy was the ultimate governance of the universe. **Boethius** wrote treatises on theological subjects, but never mentioned Christianity's scriptures. Why not? The probable answer was

his most quoted sentence, the essential Scholastic principle, "As far as you are able, join faith to reason

Two truths He said, if the truths of God and man conflict, faith prevails. God foresees our thoughts and actions. God and the *City of God* can be understood by Man's reason, the opposite of **Pseudo Dionysius** (500). He translated **Aristotle** on logic and **Euclid's** *Geometry* from Greek to Latin. The Romans had not done so. The barbarian king **Theodoric** falsely accused him of treason and executed him

525 **Dionysius Exiguus** established the AD-BC (Anno Domino-Before Christ) dating system.

c.529 **Rules for monks** **Benedict of Nursia** (c.480-c543), Italian monk, repelled by the corruption in the Roman Church, became a hermit, then founded several monasteries, the first one in 529 on Monte Cassino, devoted to poverty, prayer, and good works. He wrote a book, with 73 chapters with rules for communal life, *Regula Monachorum*, still widely followed. His rules covered all aspects of a monk's life.

This regularized monasticism in Europe. His monks proselytized throughout the Roman empire and into pagan regions. Benedictine monasteries spread all over Europe. The monks copied and preserved Greek and Roman texts, but made little use of them.

529 **Greek schools closed** The Eastern emperors in Constantinople were closer to the Christian patriarch in Constantinople than the Roman emperors were to the bishop of Rome. Emperor **Justinian** in Constantinople founded a university, and, under pressure from Christians, outlawed paganism.

In Athens, he closed **Aristotle's Lyceum**, the Epicurean *Garden*, the Stoic *Porch*, and **Plato's** skeptical pagan *Academy*, all under his control. They had lasted c.800 years and their closing marked the end of Greek higher education in the West. Greek academies continued for centuries more in Constantinople. Over time, Athens gradually dwindled to a village of 2,000 by 1829..

532 **Justinian law: basis of modern civil law** The Eastern Roman empire, nominally Roman, based in Constantinople, was essentially Greek. Emperor **Justinian** promulgated the *Codex Constitutionum*, codifying the then large body of Roman law. It was in effect until Canon law replaced it. It is the basis for modern civil law. It is the prime legacy of Rome to legal history. *Inter alia*, it took all rights from non-Christians, and enacted harsh penalties against Jews and pagans. Not *believing* in the Resurrection and Last Judgment were capital offenses.

Justinian built the huge *Hagia Sophia* (goddess of wisdom) *Basilica* in Constantinople, consecrated in 538, the greatest building of the Byzantine empire and the West for 1,000 years.

In 532, supporters of the Green chariot team rioted against the supporters of the blue chariot team, Emperor **Justinian's** favorite. The riot escalated, half of the city burnt down, c.30,000 killed.

Faith, Flat Earth **Cosmas Indicopleustes**, who had been to Hindustan, wrote *Christian Topography*. Based on *Revelation* 1:7 and 7:1, it portrayed a flat world, surrounded by mountains, and was the center of the universe. Greeks, however, knew the world was a sphere.

Dogma replaced reason Natural philosophy: In the West, dogma replaced science: Except for medicine, scientific inquiry stopped. Canon law replaced the *Justinian Code*. Only fragments of the Justinian code survived.

The natural world was important only to show how it fit into God's plan. Christian dogma contributed to the decline of Greek culture. Christian revelations replaced Greek facts. Faith replaced virtue.

Justice in Heaven replaced justice on Earth. Romans had never been particularly interested in scientific inquiry in any case. The universe of **Augustine** was static. All that mattered was preparation for the next life. Their attitude toward the natural world was apathetic, if not pessimistic.

c.549 **Impetus diverts from Aristotle** Natural philosophy: In Alexandria, **John Philoponus** (c.490-570), a Syriac Christian philosopher, initiated and anticipated the eventual liberation of science from **Aristotle**. He saw that heavy and light objects fell at the same rate. He developed the theory of impetus (a decisive step from **Aristotle** toward **Newton's inertia**). How? He partly accepted **Aristotle** idea that continued motion depends on continued pushing by something, but modified it to say that a hurled body acquires a motive power or inclination for forced movement from the thrower.

He proposed a version of a cosmological argument for God based on the impossibility of an infinite temporal regress, postulating that time itself must have had a beginning.

c.550 **Life in the Dark Ages** Overview: By 550, the Roman empire with one language, one set of laws, possessing a single culture, had disintegrated into separate feudal principalities, bishoprics, kingdoms, with regional differences. During the *Dark Ages*, the three main problems for people in the West were: food, protection from

thieves / murderers, and the most important, God (the threat of eternal torture in Hell for “sinning.”)

**Science
stopped
in the West**

Scholarship declined: Men of intellect joined monasteries that then became the only centers of learning (which unfortunately studied dogma, not Greek rationalism). Scholars used scriptures, not reason, to explain natural events. With the West's most intelligent persons in monasteries (many in far-off Ireland), they did not become the leaders in society that would have benefitted from their talents.

Roman naturalism and rationalism (reason as the sole source of knowledge) gave way to the mysticism and transcendentalism of the Church. These changes did not occur in Persia, Hindustan, or China, the other great civilizations. All cultures had their own calendars and their own gods or no gods. Christianity, not Greek rationalism, dispelled the pagan gods

**Feudalism:
The best
killers
became
European
nobility**

Political Theory, feudalism: Europe's numerous mountains and rivers lent themselves to many independent geographic centers of power. Land was the source of the necessities of life. In the wreckage of the Roman empire, where one man ruled over a certain area of land emerged.

Sir **Walter Scott** (1805) explained the origin of feudalism, “What can one see in the longest kingly line in Europe, save that it runs back to a successful soldier?” In other words, the best killers became lords, nobility. They ruled by force, protected their vassals, but at a high price, i.e., half a vassal's crop or a tax for some privilege like the right to operate a mill. Slaves became serfs

The concept of “nobility” was ancient. In the Roman republic, the wealthiest men, that is, those who owned the most land, constituted the senate. Ownership of goods and land passed on death to a man's descendants. In feudal Europe, in any geographic area, only the lord / king was autonomous. Feudal lords allied themselves with the Church, and together, they controlled the peasants. Nobility is the insidious concept of *hereditary merit*.

c.591
**Gregory
acted
like the
preeminent
bishop**

Gregory the Great (c540-604), Benedictine monk, from a wealthy family, became bishop of Rome.

He was the most influential bishop of Rome who transformed the bishop of Rome into being the preeminent bishop and then pope, with power over other bishops then largely autonomous, as well as kings and princes. He did so by simply acting like a leader. He was also the civil ruler of Rome.

He initiated reforms in the liturgy and Church administration and sent numerous letters to bishops lecturing and instructing them on Church matters, often criticizing them for simony.

**But he said,
“All bishops
are equal”**

Even so, he specifically declared all bishops equal. He made his family home into a monastery.

He sold his vast properties and used the money to build monasteries and to care for the poor. He told bishops to do the same. **Gregory** criticized Bishop **Desiderus** of Vienne (SW of Geneva) for teaching grammar. **Gregory** said all sexual desire is sinful in itself.

The patriarch / bishop in Constantinople didn't accept **Gregory's** assertion of power over other bishops. He saw **Gregory** as a barbarian. **Gregory** said that churches were symbols of heaven on Earth and worthy of grand opulence. Priests were chosen from the noble families.

He devised an early concept of Purgatory, where moderate sinners waiting out their penances for sin before going to Heaven. He is now considered a pope and a saint.

**Gregory's
Answer to
Problem:
Suffering
is a
mystery.
I.e., no
answer**

Gregory answered *The Problem of Suffering / Evil* by saying that the reason why God permitted evil was a mystery, so one had no basis to challenge God's actions, but He did say suffering tests the faith of believers. This infers his God is not smart enough to figure that out without someone suffering. Said suffering is not logically necessary to determine a man's faithfulness.

Contrary to **Tertullian** (ref. AD 200) and other churchmen in the future, **Gregory** admitted the superiority of reason over faith when he said, “If the work of God could be comprehended by reason, it would be no longer be wonderful, and faith would have no merit if reason provided proof.” He permitted priests to marry if remaining celibate became too difficult.

593 Printing: China developed wood block printing by 593, printed a newspaper in Peking (Beijing) in 700.

**Original Sin
caused
slavery.**

Slavery: Saint **Isidore**, Archbishop of Seville, like **Augustine**, justified slavery as due to Adam's *Original Sin*. He said that “the punishment of slavery was divinely imposed on the human race, so that God might inflict slavery more mercifully on those He perceived are not suited to liberty.”

John Stuart Mill (1835) deflated such hypocrisy, saying, “Every established fact which is too bad to have any other defense is given as a injunction of religion.”

- 604 Japan adopted *Buddhism* as a state religion. Shinto continued to be Japan's principal religious tradition. In Europe many monasteries were founded by monks returning from Ireland, bringing books and scholarship.
- 610 **Islam** founded *Islam* (means *submission*): **Mohammed** /*The Praised One*, (c570-632), born **Ubu'l Kassim** in Mecca, an orphan, was first a shepherd for, then camel driver for, then servant to, then husband of, an older rich widow, **Khadija** (- 619), with whom he had a daughter, **Fatimah bint Mohammed** (c605-632).
In 610, he reputedly got his first message from God, Allah, through the archangel Gabriel. He began to write the *Koran* /*Qur'an* with guidance from Gabriel. He wrote and revised it until he died. It is the ultimate source of spiritual guidance for Muslims worldwide.
- 622 Arabs he had criticized drove **Mohammed** and 75 followers out of Mecca. They went to Jathrib, later renamed Medina (city of the Prophet). This was the *Hegira/Emigration*, year one of the *Islamic* calendar.
Hegira **Mohammed** said Adam, Noah, Job, **Abraham**, **Moses**, and **Jesus** were prior prophets but not God, and he was a prophet for the authentic religion of **Abraham**, to whom Allah, the true God, revealed himself, and whose teachings had been distorted by Judaism and Christianity. Allah is not only omnipotent, omniscient, loving, but a personal god who listens to prayers and reacts to the actions of his creatures.
- Abrahamic Gods** The Christian, Jewish, and Muslim Gods are all claimed to derive from **Abraham**, so they are each referred to as an Abrahamic God. They are also of course claimed to be perfect.
- Faith** **Mohammed** had 13 wives, most for political reasons or to care for a widow. Other Muslims were allowed four. *Surah* 4:3. Like Christianity and other state-supported religions, life was proclaimed a test, and on death, were judged on how obedient to the *Qur'an* one was. Some went to *Jannah* (Paradise) or *Jahannam* (Hell). *Islam* has no separation of church and state, unlike Christianity, at least nominally. Islam, as an offshoot from Judaism, was the culmination of the trend towards monotheist, eschatological, egalitarian, universal religions. **Mohammed** became ruler of Jathrib.
- 624 **Mohammed** consummated his earlier marriage to then nine year old **Aisha**, daughter of his most faithful follower, **Abu Bakr** (573-634). **Mohammed** owned slaves, one of whom bore him a son.
After failing to convert tribes of Jews around Medina to *Islam*, he simply killed the men, enslaved the women and children, and gave their land to his followers.
The Qur'an does say that freeing a slave is praiseworthy and would be rewarded in Paradise.
- 628 **Mathematics: Brahmagupta**, a Hindu mathematician, used a zero, showed how to calculate the motions of planets; said gravity was a force of attraction, devised a solution for a quadratic equation.
- 630-32 **Mohammed** conquered Mecca. He issued rules for the fair treatment among all his followers, including slaves. As he got older, he stressed the importance of force to spread *Islam*. In 632, he died and ascended into Paradise on a winged horse. **Abu Bakr** then became the first *caliph* / *successor*.
- c.634 **Shi'ites vs. Sunnis** *Islam*: A split developed between *Shi'ites* who said that only descendants of **Mohammed** (by any of his wives or slaves) could lead *Islam*, while *Sunnis* (means tradition) said Muslims should pick a leader of utmost piety. (85% of Muslims now are *Sunni*.) The split was based on rivals **Aisha** and **Fatimah**. Muslims set out to conquer the world for Allah. **Abu Bakr** died in 634. Caliphs 2, 3, and 4 were assassinated.
- c.642 **Umar ibn al-Khattab** (584-644), the second *caliph*, a powerful and humble man, by 642, conquered the rest of Arabia, Syria, Persia, and Egypt (including Alexandria, a center of scholarship, obtaining Greek texts taken there after the fall of the Western Roman Empire.) **Umar** said, "Burn the libraries, for their value is in the *Qur'an*. Nonetheless, Muslims in Alexandria embraced Greek learning, becoming physicians, mathematicians, and astronomers, often building on Greek texts.
Islam came to dominate most of the eastern parts of the Roman Empire (except Asia-Minor).
- 642 **What Muslims know** *The Qur'an*: The Earth is fixed and does not move. 27:61. Jews are the greediest of all humans. 2:96. Non-Muslims will burn in Hell (repeated over 200 times). Don't be friends with unbelievers [non-Muslims]. 13:118, 3:178, 4:189, 4:144, 5:51, 5:57 and 58:14-15. Infidels] are all liars. 6:29. Thieves should have their hand cut off. 5:38. Gabriel took **Mohammed** on a winged horse to Jerusalem and to Heaven, where he spoke to **Abraham** and then back to Earth. 17:1
- 650 **Uthman** The third *caliph*, **Uthman** (596-656), a base and vain man, compiled the first accepted *Qur'an*, the text of the sayings of **Mohammed**), purportedly inspired by talks with the archangel Gabriel.

He destroyed all other versions. The *Qur'an* has passages of peace, justice, mercy and charity for the poor, but taught Muslims to kill non-Muslims and that secular culture was incompatible with moral and spiritual health. *Islam* as an ideology prescribed how to build and govern a state. It made it the duty of every Muslim to struggle for the creation of a universal *Islamic* state. *Islam's* earthly mission was political, to form a nation.

Like **Aristotle**, **Mohammed** wrongly thought the driving force in natural events was purpose.

- The Qur'an has ideas from the Bible, Zoroaster, & a Hell and a Heaven** *The Qur'an:* has 114 chapters /*Surahs*, sorted by length, the longest first. Like the *Bible*, it has ideas from other religions' scriptures, the *Hebrew Bible*, works of Zoroastrian, and Christian and pagan myths. It has a day of judgment, one God, a paradise for the faithful, and a hell for unbelievers. It instructed, "Believe only Muslims" 3:73. *Islam* evolved and is closer to Judaism than Christianity. **Mohammed** taught that Allah made humans to worship him. He said images and statues of men were abominations. Like Christianity (**Aquinas** 1273), the worst sin, the only unpardonable sin, was *shirk*, identifying other gods with Allah. He began to denounce the polytheistic faith of fellow Arab tribesmen.
- 99 names for Allah** *The Qur'an:* has 99 names for Allah, including "The All Mighty, Bringer of Death, Possessor of Supreme Power, Destroyer, Distresser, Causer of Death, Ever Dominating, The Avenger, All Encompassing, Creator, Most Gracious, Most Merciful, Most Holy, All-Peaceful, Forgiver, Provider, All-Knowing, All-Seeing, All-Aware, Incomparably Great Judge, Absolute Vanquisher."
- Muslim beliefs:** Male superiority: Like the *Bible*, the *Qur'an* speaks mainly to men. men control women and slaves. Men could have four wives (plus slave girls). Men "have a degree of advantage" over their wives. *Surah* 2:228. "Righteous [wives] are devoutly obedient" *Surah* 4:34. Fathers can't let their daughters marry unbelievers. 2:221. But they can give their daughters to strangers to protect guests. 15:71. Women in public must dress modestly so not to reveal their ornaments or beauty. 33:59. In legal matters, two women witnesses equal one male witness. 2:282. Sons inherit twice as much as daughters 4:11 and 4:176. Believing women should lower their gaze in public. 4:31. Husbands may beat their wives (lightly) if they sense "disloyalty or ill-conduct." 4:34..
- c..650 Homosexuality is condemned: 7:80-81. Like the *Bible*, apart from its claims of divinity, it has many scientifically nonsensical statements Namely: Allah turned Sabbath-breaking Jews into apes. 2:65. Allah made a man die for 100 years and then revived him. 2:259. Allah turned some Christians and Jews into apes and pigs. 5:60. Allah turned a mountain into dust. 7:143. Allah gave **Mohammed** an invisible army. 9:40. Allah turned **Moses's** staff into a serpent. 20:18-20. All humans but Noah's family were evil. 21:77. An ant spoke. 27:18. Suffering / Misfortunes are one's own fault. 42:30.
- Kill non-Muslims everywhere** Many *surahs* of the *Qur'an* command hating and killing non-Muslims. (like *Deuteronomy*). "Fighting is prescribed for you, [It] is good for you." *Surahs* 2:216, 4:89-91, 9:5, 12-4, 25:52, 47:4. For a while I will grant [Jews] their pleasure, but will soon drive them to the torment of fire." 2:126. Slay the Pagans wherever you find them. 2:191-2, 4:89, 9:5. Let not the Unbelievers think that our respite to them is good for themselves, We grant them respite that they may grow in their iniquity; but they will have a shameful punishment. 3:178. Smite infidels above their necks [behead them]." 8:12.
- Kill the Pagans wherever you find them** "When you meet the Unbelievers in battle, never turn your backs to them. Those who do draws on himself the wrath of Allah, his abode is Hell. 8:15-16. Fight against them until idolatry is no more. 8:39 and 2:193. Kill the Pagans wherever you find them, seize them, beleague them and lie in wait for them in every stratagem of war. Fight those who do not believe in Allah." 9:29. "Strive hard against the infidels and be firm against them. 9:73. Fight the Unbelievers and hypocrites. Their abode is Hell. 9:73 and 9:123.) Those with [**Mohammed**] are ruthless against Unbelievers." 48:29.
- Jihad** **Mohammed** used the word "*jihad*" / striving in two senses, one's inner struggle against evil and the real war against the of *Islam*. Sects of *Islam* use the word to describe their wars against each other.
- Religions relentless against other faiths** Thus, the three major Western religions, Judaism, Christianity, and *Islam*, were all relentless against other faiths. **Mohammed's** rules for Muslims: Don't harm non-soldiers in their houses, spare the weakness of women, don't injure nursing infants or the sick. Don't destroy houses, orchards, or date palms of those who don't resist. Practice *purdah*, the seclusion of women. Notwithstanding commands to hate and kill non-Muslims, some *caliphs* in some locales tolerated

Christians and Jews, especially in Spain, as they were "*People of the Book*." Muslims translated captured Greek texts into Arabic which were, centuries later, translated into Latin and became important for the Western rise in intellectual studies.

The Muslim Paradise

The Muslim Paradise is a garden of perpetual bliss, with flowing streams of clean water, clarified honey, milk, and wine, with every kind of fruit, where every wish is fulfilled. Despite *Islam*'s prudery, those who die in battle for *Islam* go straight to Paradise where virgins await them; *Surahs* 2:25, 35:56. 38:51-2 and 44:52-6, 47:15, 52:17-20 "In each [tent] there shall be virgins chaste and fair . . . Dark eyed virgins sheltered in their tents whom neither man nor Jinn (a spirit) will have touched before . . . Virgins as fair as corals and rubies." *Surahs* 55-56. Gardens and vineyards and high bosomed virgins for companions." 78:31-33. (Needless to say, there is no mention of the virgins' consent.)

Mohammed knew what his nomads wanted, wine and women

"There is no hurt, no sorrow, no fear, no shame, everyone is 33, all (men) wear grand robes, bracelets, perfumes, recline on couches inlaid with gold and precious stones, have exquisite banquets, served scented wine in priceless vessels. "Round about them will serve boys of perpetual freshness: if thou seest them, thou wouldst think them scattered pearls." 56:17 and 76:19.

Mohammed knew what his male desert nomads fervently desired, an oasis with alcohol and girls, and maybe "boys of perpetual freshness". *Islam*'s "hell" has seven levels of misery, depending on one's degree of sinful behavior. The age of consent for females was generally puberty.

Honor Shame

How Muslims think: The concepts of shame and honor are most important in *Islam*. The *Qur'an* speaks often about shame / disgrace and honor. Psychologists refer to the themes of certain religions as *shame-based* (*Islam* and *Shinto*) while others like Christianity are *guilt-based*.

c. 650 Shame & honor are important to the lower classes

Shame and honor are especially important to people in the lower classes everywhere. In a guilt-based culture, one can feel guilty even if no one else is aware of the sin. Shame arises only when others are aware of a potentially embarrassing event. Honor killing of one's raped daughter is an illustration of the power of Muslim shame [& stupidity]. Both shame and guilt / sin are powerful devices of social control and are thus useful for rulers. Guilt is about behavior, while shame is about self. **Mohammed** forbade studying anatomy.

Five Pillars of Islam

The Five Pillars of Islam are: Profess one's faith, pray five times daily, give alms, fast in Ramadan, go to Mecca once. As in Christianity, *Islam* uses all the techniques of social control by the clergy. Muslims were / are God-obsessed like Jews and Christians. All three religions preached an imminent Judgment Day. The ultimate objective for Muslims (like Jews and Christians) was to seek the pleasure of God/Allah by living in accordance with their Scriptures. Allah is a God of might more than a God of love. *Islam* is monotheistic. It has no transubstantiation, Trinity, resurrection, sacraments, or reincarnation. **Mohammed** did not claim to be divine, just a prophet.

Islam spread quickly by conquest

Never has a religion spread so widely so quickly. By 650, Muslims had conquered all of the Mid-East and all the North African lands on the Med. (except Carthage and Tangier). **William McNeill**: "The rise of *Islam* offers perhaps the most impressive example in world history of the power of words to alter human behavior in sudden, surprising ways." Some Christian monks blamed the defeated Christians for not being holy enough (blaming the victim). Muslim control of the Mid-East eliminated those bishops most prone to challenge Rome for primacy in the West. Sunni Muslims accepted the *Sunna*, a body of sayings and customs of **Mohammed**, as of equal authority with the *Qur'an*. The split with *Shi'ites* endures. They kill each other. There are also smaller Muslim sects.

China

Technology: Chinese built an iron-chain suspension bridge c580, block-printed books c640, developed porcelain c700, used paper money in the 9th century. China, Hindustan, and Japan did not seek to spread their religions. China's capital, Xi'an, was the richest city in the world, population almost 2M.

675 Trinity

11th Council in Toledo (just 17 bishops) reaffirmed the doctrine of the Trinity. If a bishop seduced a nobleman's wife, daughter, or niece, he is to be deposed and excommunicated. If he seduced lower ranking women, no problem. Church Councils rules evolved in time into international law.

677 **Hui-neng**: Perfect Buddha wisdom is in everyone. To learn one's Buddha nature, one's mind must be free.

683 Christianity: **Erwig**, Visigoth king, called the 13th Council of Toledo. It forbade clergy who had converted to Christianity from living with their wives, clergy couldn't sue other clergy, Jews couldn't have Christian wives, slaves, or concubines. This freed all Christian slaves owned by Jews.

c711 Muslim Empire: Muslims, having conquered North Africa, then, in 711, crossing the Strait of Gibraltar, took Southern Spain. Muslims also expanded into Sub-Saharan Africa, Hindustan, and SE Asia.

Muslim scholars seized on Greek learning, started libraries in Baghdad, Cairo, Cordoba (400,000 volumes), Toledo, and Basra (Southeast Iraq), which became centers of Muslim learning.

Muslims did the only science in the West. But, it was limited.

Math: The **Abbasid** caliphate (third caliphate to succeed **Muhammad**) began to translate Greek texts like **Euclid's Geometry** into Arabic. Virtually the only science studied in the West during the *Dark Ages* was done by Muslims, largely in math, optics, and medicine.

Muslim mathematicians combined Greek math with Hindu (Arabic) numbers. Hindus had a zero and the decimal system. It replaced the cumbersome Roman numerals. It greatly simplified calculation. Arabic numerals was the most important single innovation that the Muslims brought to the West, c750. Europeans only started using it c500 years later.

718-19 Christian Constantinople withstood a one-year Muslim siege, *Islam's* first serious defeat.

c.726 Society: The educated class in Eastern Christian regions spoke Greek. In the West, they spoke Latin.

This contributed to their separation and mutual distrust. In the East, the Greek Church stayed obedient to the emperor in Constantinople who decided matters of faith and appointed bishops and patriarchs. The bishop of Rome and the emperors of the Roman empire competed for power. The Byzantine emperor in Constantinople banned religious images. The Roman pope encouraged them.

731 Calendar: The Venerable **Bede**, Brit, monk, made **Jesus's** birth as year one for Christians. (**Dionysius Exiguus** around 525 had first used it.) He said that before Adam's fall animals were harmless, but became harmful due to Adam. **Peter Lombard** in the 12th century in his book *Sentences*, which became a text book of theology through the Middle Ages repeated **Bede's** reason. **John Wesley** said before Adam animals were harmless, but made poisonous by Adam's fall. The Church held that before Adam, snakes stood erect, walked and talked.

Charles Martel

732 **Charles Martel**, *de facto* king of the Franks, allied with the pope, saved Christendom at Tours and Poitiers (West- central France) by defeating the Muslims advancing from Spain. The Muslims retreated to Spain, where, in 785, they built the Great Mosque in Cordoba (Cordoba had 70 libraries, a postal service, bookshops, gardens). In philosophy, inhibited by the *Qur'an*, Arabs were better commentators than original thinkers.

750 Political Theory: In one century, the *Islamic* empire, went from insignificant tribes to being the most advanced and powerful civilization in the West. Greek writings were translated into Arabic.

Islam The wealthy families rivaling for the caliphate schemed and murdered each other.

By 750, *Islam* ruled from Spain across Africa to the Indus River. Islam's strength came in part from its unity of religious and civil government (all the more coercive for the rulers than separate power centers). It was also the best social and political order. Wherever Islam went, it found oppressed, apathetic, unorganized, uneducated peoples living under unsound selfish governments.

Christians & Muslims feared dissent

Political Theory: Christendom and Islam both developed doctrinally developed religions, demanding belief in their doctrines and teachings and rejected all deviations of thought as dangerously heretical, and thus to be eliminated. Belief itself became the central religious duty. Around 750, the people of Constantinople, who had been speaking Latin, began speaking and writing Greek. The influence of Greek thought also made a split in Islamic thought between progressives and traditionalists.

c.750 Fear of science: Pope **Zachary**, "To think Earth is a sphere is a heresy and deserves excommunication."

751 Arabs captured two Chinese paper makers at Talas; then made paper in Samarkand and Baghdad.

Fake donation

753 **Donation of Constantine**: **Bishop/ "Pope" Stephen 3** gave a document forged by papal official **Christophorous** to **Pepin** the Short, king of the Franks. It said that **Constantine** in AD 320 had donated dominion over the Western part of the Empire, including Rome, to the then "pope" of Rome, **Sylvester 1**, and his successors. So **Pepin** gave to **Stephen** lands and cities he ruled, which became the Papal States, making the pope a rich feudal lord. It was proven a forgery 700 years later.

Mayans

c.776 Mathematics: Mayans (Yucatan) used positional notation with a symbol for zero. (before Europeans). Mayan mathematicians met in an astronomical congress at Copan. Mayans used a base 20 arithmetic system. Mayans had a written language and a coastal trade

using large canoes, no sails. Mayans were the most advanced civilization in the Americas.

Greek land astrolabe Greeks had invented a crude land astrolabe around 200 BC. It measured a star's angle above the horizon. Muslims perfected it to help them pray facing Mecca. It wasn't used in the West for centuries.

c.780 **Jabir ibn Hayyan** used scientific methods for chemistry, developed distillation, liquefaction, filtration.

787 The Second Nicaean Council met to restore the use of holy images; and decreed that images of **Jesus**, saints, and **Mary**, should be displayed everywhere; all visual art works were ordered to be faithful to the *Bible*. Sculpture was condemned as sensual.

Investiture Dispute Political Theory, Church vs. kings: In the West, the struggle between Church and the king or prince over who could appoint bishops centered *Medieval* Political Theory. Monarchs argued for the divine right of kings, citing the *Bible*. Bishop/Popes had the Papal States and troops. To exercise civil power, bishop/popes crowned (and excommunicated) eight emperors of the Roman "empire".

The clergy cited the *Bible*, the fake *Donation of Constantine*, and **Augustine**, and argued that soul saving was inherently more important than concerns of earthly life. (More on investiture 1054)

Peasants were terrified of Hell Modern man can not appreciate the overpowering stranglehold that the Church held over the minds of medieval peasants every waking minute. All lived in constant terror of Hell for eternity, even for trivial wrong thoughts. **Augustine** had made the world static and unchanging to bring persons closer to God, and to prepare for the next life, no other reason. The Egyptians had the same system.

Most powerful person in Europe Political Theory: Charlemagne/Charles the Great (742-814), son of **Pepin**, became the most powerful man in Europe as king of the Franks and Lombards. He was active in Church affairs, saw his empire as a theocracy, dedicated to guiding people's souls to heaven. So, he told monasteries and cathedrals to build schools to instruct pupils in the proper faith, teaching **Capella's** seven liberal arts.

The main source of basic knowledge were the texts of **Isidore**, archbishop of Seville, on grammar, rhetoric, medicine, mathematics, and history. The erudite atmosphere in monasteries led to the founding of universities, whose diplomats could teach in any Christian country. The universal language of educated people in the West was Latin.

799 **Charlemagne** conquered & ruled all Western Europe except Scandinavia and Southern Spain (killing around a million). He restored Pope **Leo 3** to the papacy in Rome after a palace coup had deposed him.

800 In return, **Leo 3** crowned **Charlemagne** as Emperor of the Roman Empire, so **Charlemagne** declared himself "crowned by God," instituting the concept of the "Holy Roman Empire." ("HRE"). He ruled from Aachen (North-Western Germany) to the Roman bishop/pope's relief. The emperor in Constantinople was ignored. In the 9th century, Irish scholars, fleeing from Scandinavians, fled back to the continent.

The Church split. East and West **Leo 3** took over the Roman Western part of the Church from the Greek-oriented Eastern part and became supreme bishop in the West, although in Constantinople, the emperor was superior to the local Christian bishop / patriarch. **Charlemagne** in the West appointed bishops. Although illiterate, he sponsored a revival of the arts. Monasteries were becoming corrupt and dissolute.

By 800, **Euclid's Elements of Geometry**, **Galen's** books (medicine), and **Ptolemy's Almagest** (astronomy) had been translated from Greek to Arabic in Baghdad.

814+ After **Charlemagne's** death in 814, the HRE split into its German and French parts and disintegrated into many small kingdoms, duchies, cities, principalities, and bishoprics with varying degrees of sovereignty from him. Popes wore robes with golden jewels. The HRE was, as **Voltaire** later said, neither holy, nor Roman, nor an empire. It exercised no effective power beyond the Germanic states and Italy. The HRE was a disorderly and primitive group compared to the Muslim empire. Slowly, stirrings of commerce began to reappear. Towns grew.

c.815 Buddhist **Adi Sankara** (788-820), God couldn't have made the world as it is so full of cruelty, suffering.

Making death a release from pain Buddhism and Christianity: William McNeill (1917-2016), historian, said that like Christianity, Buddhism explained suffering. It offered the same sort of comfort to survivors and victims of violence or of disease as Christianity did in the Roman world.

Christianity, too, took shape in the cities of Jerusalem, Antioch, and Alexandria where

disease was more common than in cooler and less crowded places. From their inception, therefore, both faiths had to deal with death by disease as one of the common facts of life. So, both religions taught that death released one from pain, and allowed entering a delightful afterlife where loved ones would be reunited, and earthly injustices and pains amply compensated for.

- c.820 Islamic Golden Age: In the 9th century, Muslims began a large scale program translating Greek texts into Arabic. **Pervez Hoodbhoy's** *Islam and Science*, wrote, "Should a non-Muslim have alleged that Muslim natural philosophy is but a regurgitation of Greek science, one can safely suppose that he would be angrily challenged. But coming from supposed defenders of the faith, these insults to Muslim science and its heroes have drawn little reaction."

Evolution **Amir ibn Bahr al-Jahiz's** *Book of Animals* described 350 kinds of animals. It said species evolved seeking food. Caliphs, especially in Spain welcomed non-Islamic scholars.

- c.825 Mathematics: **Mohammed ibn Musa al-Khwarizmi** (780- 850) Persian mathematician, astronomer, geographer, used positional notation, the zero, and the base ten decimal point system from Hindustan.

Algebra His book, *al-jabr/Algebra* (825), was the first book on the systematic solution of linear and quadratic equations, using letters for unknown numbers. Thus **al-Khwarizmi** is the Father of algebra.

Algebra and geometry deal with static structures, not bodies in motion (dealt with by calculus, discovered by **Newton** and **Leibniz** only in the 17th century). **Khwarizmi** also wrote a *Treatise on Spherical Trigonometry*. Persians developed windmills to grind grain in the 9th century.

Algebra. Algebra gave math a broader development path. It rests on certain general properties of numbers, i.e., Communicative law for addition: Numbers total the same no matter which order you add them up. Associative law for addition: Numbers total the same no matter how you group them. $a+(b+c) = (a+b)+c$ Communicative law multiplying: Numbers total the same no matter how you multiply them. $AxBxC = AxCxB$ Associative law for multiplying: Numbers total the same no matter how you group them. $a(bc) = (ab)c$. Distributive law: If numbers are added and multiplied, the way they are grouped affects the total.

c.846 **Polaris, the North Star is above the North Pole.** Sea Navigation, marine astrolabe: *Polaris*, the North Star, is almost directly above the North Pole. So it's barely visible from the Equator above a sailor's northern horizon. And looking North from any specific latitude north of the equator, *Polaris* is at the same angle above one's northern horizon. With an astrolabe sailors could then easily determine their *latitude* just by measuring the angle of *Polaris* above their north horizon(its declination). For other stars, a star map could be turned to match the sky at any time. Seeing that star's declination for that day in a star map gave one's *latitude*. **Astrolabe** Where a sailor was East-West, i.e., *longitude*, was the problem. (See 1533, 1616, '75, 1714, '61)

- c.846 **Hadith** Islamic Dogma: **Mohammed Sahih al-Bukhari**, compiled *Hadith* (sayings and events of Mohammed). He collected 300,000, reduced them to 2,602. *Sunni* Muslims considered them as the most trusted collection. Only a few *Hadith* encourage scholarship. Like the *Bible*, many *Hadith* contradict other *Hadith*.

- c.850 Mathematics: **Al-Sabi Thabit ibn Qurra** (826-901), in Baghdad discovered formulas in algebra, geometry, and astronomy. He calculated a formula to determine *amicable numbers* (*Amicable* means either of a pair of numbers each of which equals the sum of the different exact divisors of the other, excluding the number itself).

He accurately determined the time for Earth to orbit the Sun measured with respect to the fixed stars, a sidereal year (the time it takes a planet to orbit the Sun). It differs from the solar year due to the precession of the equinoxes and is used in some calendars and astrology. He rejected **Aristotle's** idea of a "natural" place for objects. He proposed a theory of motion where up and down motions are set by weight. In the 800s, Aztecs made paper from wood pulp.

c.862 **Division of Nature:** **Johannes Scotus Eriugena / John the Irish Born Scot** (c.810-c.877) translated works by **Pseudo-Dionysius** (reputedly a disciple of St. **Paul**) from Greek to Latin, the first since **Augustine** to bring Neo-Platonism (ref. AD 230) to the European intellectual community, which then was Christian dogma. It greatly influenced Medieval thought. His greatest work, *The Division of Nature*, (called the final achievement of ancient philosophy), divided all objects into four categories: **4 categories of objects** 1. That which creates but isn't created (God). 2. That which is created and creates (Platonic).

3. That which is created but doesn't create. 4. That which isn't created and doesn't create.

Makeup of the universe Categories 2 and 3 make up the universe. He revived the transcendentalist concept of Neo-Platonism with its "graded hierarchy. "We do not know what God is . . . because He is infinite and therefore objectively unknowable." He said reason is needed to understand revelation. He accepted the *Cosmological Argument* (a first cause is God). 60 years later, Pope **Honorius 3** ordered all copies burnt. (next- **Bruno**)

c.865 **Yakub ibn Ishaq al- Kindi** (801-873) was the first the great Muslim Aristotelean. He was the first to study the *Qur'an* through Greek philosophy. He said that Muslims should learn from other cultures. He tried to show that speculative theology was compatible with philosophy. He preferred revelation.

c.870 **Islam: Ibn al-Rawandi** (c.827- 911), Muslim scholar, first a *Mu'tazilah* scholar (a school of Islam based on reason), then a *Shia*, then a *Manichaen* (two forces, good and evil) and/or atheist.
Muslim Heretics **Al-Rawandi** asserted in *The Book of the Emerald* that the *Qur'an* was not impressive to non-Muslims. He ridiculed Muslim practices like walking around a large stone (the *Kaaba* in the Grand Mosque in Mecca that Muslim pilgrims walk around at the start of the annual *Haji-pilgrimage*). He also said that the *Qur'an* contained contradictions, errors, and absurdities.

Al-Warraq His book is only now known for criticisms of it in other books. It quoted another Muslim scholar, **Abu Isa, al-Warraq**, friend of **al Rawandi**. **Warraq** criticized Allah as an idiot for ordering his slave, man, to do impossible things and then punished him for not doing them.

Prophets are frauds He also criticized prophets as charlatans and tricksters. He said if men could figure out prophets claims, the claims are unnecessary. If they are contrary to God-given human intelligence, they should be ignored. Prophets weren't needed to teach astronomers to look at the heavens, or musicians how to play lutes. This discredited the idea of revealed religion.

c.880 **Botany: Al-Dinawari's** *Book of Plants* described 637 plants. So he was the founder of botany in Islam.

896-1049 **Ultra-corrupt popes** Christianity: In the 9th and 10th centuries the power of the papacy and Vatican fell into disrepute. The corrupt Roman family of Count **Theophylact** controlled the popes for 150 years. During 896-1049, there were 46 popes, widespread debauchery, incompetents, treachery, adulterous popes, mistresses, nepotism, child bishops and cardinals, bribery, pimps, and murderers. Buying a bishopric or a parish or two was the norm.

China was, the most advanced China was the most intellectually sophisticated and technologically advanced country; it invented gunpowder in the 800s and used it as a flying flaming projectile around 904. China invented the canal lock c.983. It was little known to the West.

c.900 **10th century Only Muslims did science** The only scientific advances during the *Dark and Middle Ages* in the West were from Persians and Muslim Arabs. The obliteration of Western (Greek) knowledge, in the *Dark Ages* was so total that the West eventually had to re-learn its philosophy and science from Muslim translations of Greek texts. (Mainly from Spain). Baghdad was the intellectual center of the West. Arabs calculated the angle of the ecliptic (orbital plane of the Sun's planets) and the procession of the equinoxes. Muslim scholars translated Hindu Sanskrit texts into Arabic.

c.910 **al-Razi** Islam criticized: Mohammed ibn Zakariya al-Razi (c.854-c.925) Persian polymath, wrote a vast nine volume medical encyclopedia, *The Large Comprehensive*. He critiqued **Plato** and **Aristotle**.

Greatest Middle Age doctor and critic of Islam He was seen as the greatest doctor of the Middle Ages. He wrote a medical manual for the general public and did chemical experiments free from alchemy. He was the first to describe smallpox and measles. and distinguish between them.

Al-Razi wrote over 200 books on natural philosophy including over 100 medical books. (Books were the size of modern chapters.) He has been described as the greatest dissenter in the whole history of Islam. He studied **Galen's** massive Second century medical book

A Muslim debunked phoney prophets and religions' "miracles" were tricks **Al-Razi** criticized those religions that claimed to be revealed by prophets as God should not favor some people with knowledge setting them above the masses as it incites hostility among men. He said that the variety of religions was evidence that they were man-made and thus false (*Problem of Contrariety*) p. 406-7). He also said the "miracles" of prophets were tricks, as non-prophets also did them" If the people of this religion are asked about the proof of the soundness of their religion, they flare up, get angry, and spill the blood of whomever confronts them with this question. They forbid rational speculation, and strive to kill their adversaries."

- Prophets' fraudulent tricks** He said that common people were duped into belief. He wrote *Prophets' Fraudulent Tricks, The Stratagems of Those Who Claim to be Prophets*, and *On the Refutation of Revealed Religion*. He said the *Qur'an* recounted ancient myths, was contradictory, did not contain any useful information or explanations. **Al-Biruni** and **Avicenna** (1,000) called him heretical, to which he readily agreed.
- al-Farabi** **Philosophy:** **Abu Nasr al-Farabi** (872-951) Persian, an advocate of, but then broke with, **Plato** and **Aristotle**, moved from metaphysics to methodology. He was the first Muslim to develop a non-Aristotelian logic, categorized logic into two separate groups, idea and proof. He advocated a prophet / imam rather than **Plato's** philosopher-king. He said religion is a symbolic rendering of truth, and absent a prophet-imam, democracy was the most ideal state. He was considered second in knowledge to Aristotle.
- Second to Aristotle in knowledge**
- c. 910 **al-Mas'udi** **Geography:** **Abū al-asan Alī ibn al-usayn ibn al-Mas'udi**, (896-956) Persian (Iran), widely traveled, historian, wrote a descriptive geography of the world. Called the "**Herodotus** of the Arabs". He was a polymath and wrote over twenty works on theology, history (Islamic and universal), geography, natural philosophy and philosophy, his greatest book was *Murūj al-Dhahab*. He described Persia as "the land of winds and sand. There the wind drives mills and raises water from the streams, whereby gardens are irrigated." He wrote on the Turkic lands, China, and SE Asia
- Muslim polymath**
- Problem of Evil** In the early 900s, Rabbi **Saadia Gaon** (882-942), a Talmudic scholar posited a theodicy similar to **Ireneaus** (AD 186 and) **Hick** (1966) saying that suffering was a gift from God as it leads to an eternity in heaven.
- More food, means more people** **Technology:** Northern Europeans developed a plow with wheels, a heavy mortarboard, and a horse collar (China used it 1,000 years earlier), on larger fields than South Europe had, caused a food surplus (so a larger population) that enabled both urban and rural life and a standing army. Society was organized in the manorial system. Parish priests bought their positions and were married.
- Problem of Evil:** Rabbi **Saadia Gaon**: Suffering is a gift from God as it leads to an eternal life in Heaven.
- 932 **Spain was the jewel of Islam** **Islam in Spain:** was the jewel of *Islam* and largely independent from the rest of *Islam*. Cairo and Cordoba both claimed to be the *califate*. Toledo held all the Greek, Mid-East, and Asian texts and some Chinese and Hindu) that *Islam* had collected. Christians, Muslims, Jews lived in relative harmony.
- Toledo library** A great school of translator-scholars worked in Toledo, translating Greek texts to Arabic, and later into Latin. By 932, Muslims had introduced irrigation and new crops to Spain and made Andalusia into a rich agricultural cornucopia. Although "written" by **Mohammed**, "guided by Gabriel," with a purported authentic version prepared by **Uthman** c650, the *Qur'an* was only "finalized" in 935.
- Cordoba had 700 mosques,** Cordoba became the grandest and largest city in the West (pop.100,000) except for Constantinople, with c500,000 people, 700 mosques, 300 public baths, bookshops, a postal service, paved streets, over 70 libraries. The central library had 400,000 books, more than all of France). Other Spanish Muslim cities and industries prospered. The Christian Castillian recapture of Spain took 550 years, until 1492.
- Millennium fever:** Based on Rev. 20:7-8, Christians feared an apocalypse at 1,000. *Revelation* said that at 1000, "Satan shall be loosed out of his prison and shall go out to deceive the nations which are in the four quarters of the earth, Gog and Magog, to gather them together to battle: the number of whom is as the sand of the sea." So, before 1,000, business declined. Lawlessness increased. The Med became a no-man's zone where Moors, Muslims, Egyptians, Franks, Christians, Vikings, Greeks plundered, traded, and intermixed cultures.
- c.960 **Abu al-Qasaim Khalaf ibn al-Abbas al-Zahrawi** (936-1013) invented many surgical instruments, considered the father of surgery, and developed surgical procedures used for centuries.
- 964 **The West emerged.** **Astronomy:** **Abd al-Rahman al-Sufi/Azophi** (903-86) Persian, without a telescope, saw a "Little Cloud", unlike other more distinct stars in the *Andromeda Constellation*. **Sufi** also corrected **Ptolemy's** star list. The West began to catch up with the cultures of the Far East and the Muslims. By around 1,000, all of Europe except a small area south of the Baltic Sea and Southern Spain had come under Christianity, Roman or Orthodox.

1000-1300 Middle Ages Science in Islam-Avicenna-Biruni Mongols Aquinas

1000 Overview: 1000 was the arbitrary end of the *Dark Ages* and start of the *Middle / Medieval Ages*.

There were no sharp demarcations between *Dark Ages*, *Middle Ages*, *Renaissance*, and *The Enlightenment*. Their given dates are simplifications. The apocalypse did not happen at 1000.

A wave of optimism spread over Christianity. Merchant guilds were organized. Islam swept across Hindustan in the 11th century. Muslims were brutal against the atheistic Buddhist monasteries. Cultural change came to different locales at different times.

The European dietary staple for centuries was bread, of varying grains. In Britain 10% were slaves. Eastern Orthodox Christians did not accept the **Augustine's** Western concept of *Original Sin*. Chinese built a mechanical water wheel clock, used a spinning wheel, and printed books with movable type.

The center of wealth, power, and culture began to shift to North Europe. Most of Spain, under Muslims, flourished. Virtually all the men who contributed to Western intellectual life were churchmen, except **Dante**. The Middle Ages had its full of famine, filth, disease, violence, intolerance, and oppression.

The two major occurrences that decisively affected the balance of the known world during 1000-1500 were 1. the movement of Turkish, Mongol, and Tungusic peoples from the Eurasian steppes, reaching a climax under **Genghis Khan** (Universal ruler) (c1158-1227). He was first great Khan (Emperor) of the Mongol Empire in the 13th century, and, 2. beginning c1200, the rise of a vigorous civilization in Western Europe.

c.1000 **Medicine: Abu Ali al-Husain ibn Abdallah ibn Si'na / Avicenna** (980-1037), Persian, most renowned Medieval Muslim mathematician, physician at 21, philosopher, most influential name in medicine from 1000 -1500. Widely traveled, he wrote the million word *Book of Healing*, an encyclopedia that covered all aspects of human health, including diagnosis, treatment, and prevention of disease, as well as pharmaceutical sciences and the use of medicinal plants. It was the standard medical textbook in the Islamic world and Europe for centuries. It provided a complete system of medicine according to the principles of **Galen** and **Hippocrates**. He discussed psychosomatic illnesses and melancholia.

He made Science equal to dogma His *Book of Healing* was used for centuries in the West. He also wrote *the Canon of Medicine* which was used in medical schools until the early 1800s. It introduced experimental medicine and clinical trials, and systematic experimentation and quantification into the study of psychology.

He said science explained the cosmos as well as religious dogma. Muslims couldn't dissect human bodies. This impeded Muslim medical research.

In other writings, he was the first to divide human perception into the five senses, hearing, sight, smell, taste, and touch. Said humans had five internal senses, common sense, representation, imagination, estimation, and recollection. He refuted astrology. He said mountains were formed by upheaval of the crust of the Earth (**Thales** had said it in 570 BC). He built an air thermometer.

Like **al-Biruni**, he said the speed of light was finite. He developed the concept of *momentum*, a precursor to **Newton's** 2nd law of motion.

New kind of logic Philosophy, *Cosmological Argument*. God is the eternal First Mover who exists necessarily by his own nature and who eternally generates the first created being, a pure intelligence, by a creative act of thought, **Avicenna** developed a system of logic different from **Aristotle's**, said that cause and effect are simultaneous and therefore God and the world are co-eternal.

He said he read **Aristotle's *Metaphysics*** 40 times and did not understand it. .

Essence is not existence **Avicenna** distinguished between essence (*Mahiat*) and existence (*Wujud*). "Existence" could not be inferred from the essence of existing things. Said that form and matter by themselves couldn't originate and interact with the movement of the universe. So existence must be due to a cause that adds existence to essence. **Aquinas** later made the same point in his *Summa Theologica* (1273).

Although not a Christian, **Avicenna showed Aristotle's power of argument by syllogism** to European Christian scholars, i.e., said that there was more to scholarship than dogma, even though he saw the universe as emanating from God, said reason has two facilities,

the practical and theoretical, which may develop to the stage of actual intellect.

- Universities** c.1000 Universities founded / chartered: Teaching **Aristotle**, Muslim, Christian, and Jewish philosophy and science *Note*: Universities were often chartered years after they began informally. Constantinople 425-**Al-Ma'mun's** House of Wisdom. *Bayt al-Hikma* in Bagdad 833. **Al-Karaouine** in Fez 859. Public hospitals in Muslim countries became colleges of medicine beginning in the 9th century. Timbuktu c.950. Cordoba c.960. Cairo-Al-Azhar c.972. Salerno-medicine 1050. Bologna-law 1088. Paris- logic-dogma c1090, (papal charter in 1200). Oxford c1096. They taught typically geometry, music, arithmetic, astronomy, rhetoric, grammar, and dialectic. Theological studies continued in monasteries.
- "Books" were short as modern pamphlets** c.1000 Science: **Abu Rayhan Mohammed ibn Ahmad Biruni** (973-1048) Persian, first Muslim to study Hindustan. Like **al-Haytham**, he developed a *scientific method*, which he introduced into mechanics. He was the first to conduct experiments related to astronomical events. He wrote 146 books, 35 on astronomy, 9 on geography, 23 on astrology as a false science. He saw and described a solar eclipse. With **al-Khazini**, **Biruni** combined hydrostatics with dynamics to found hydrodynamics. He also said astronomical data work as well if the Earth rotated and orbited the Sun as **Ptolemy's** geocentrism. He calculated Earth's diameter at just 1/4 of 1% less than current knowledge.
- Gravity** **Biruni** said all planets had an attraction of matter to themselves like Earth; that an object's weight was the weight of the fluid it displaced (**Archimedes** c.220 BC). He measured the weight of cold and hot water, of salt and fresh water. He speculated that the *Milky Way* was numerous nebulous stars.
- Speed of light is finite** He rejected **Aristotle's** view that the planets had circular orbits as well as **Aristotle's** notion that the motions of the heavens begins from the right side, from the East. **Biruni** and **al-Haytham** said that the speed of light was finite; that light went faster than sound. (**Aristotle** had said this because he said seeing is nobler than hearing). Along with **al-Kindi** and **Avicenna**, **Biruni** was one of the first chemists to reject the alchemists's theory of the transmutation of metals.
- China** 1000 China: The bureaucratic reorganization of the first **Sung** rulers took full effect. China's social and economic structure gained a new and lasting balance between the feudal (officials, landlords, peasants) and the new (merchants, artisans). Scholar / bureaucrats became the dominant class, creating a large urban literate class. Through innovation, China developed the most advanced agriculture in the world (with massive irrigation projects), industry, and trade).
- Most advanced country** China mined and smelted as much iron as all of Europe would make 700 years later. China encouraged education. Chinese ocean trade (with cotton sails, magnetic compass, known centuries earlier but first used for marine navigation in the 11th century), the astrolabe for latitude, an adjustable centerboard / keel, and far larger vessels than the West). China flourished and displaced Muslim traders in the Indian Ocean.
- Are there two truths?** c.1000 Christianity, The dispute about truth: The principal burning theological question in the *Middle Ages* in the West was "If there is a *City of God*, faith, and a *City of Man*, reason, as **Augustine** posited, do they have different truths?" This question is irrelevant now, but big then. **Charles Van Doren** (1989) named seven themes that dominated this issue for centuries:
1. **Pseudo-Dionysius**, God can't be understood by Man. (c500).
 2. **Boethius**, "As far as you are able, join faith to reason. God can be understood by reason." (524).
 3. **Avicenna** showed Christians there was more to scholarship than religious dogma. (1000, '85, '90)
 4. **Pierre / Peter Abelard** applied **Aristotle's** logic to the scriptures. (1121)
 5. **Bernard of Clairvaux** criticized **Abelard** for presuming to understand God by reason. (1140)
 6. **Averroes**: There's one universal truth that can be understood through the *Qur'an* or by reason.(1150).
 7. **Aquinas** wanted to base religion on more than just faith. (1269. '73.)
- Another burning question then was "Who was the creator? All three entities of the Trinity had their fans.
- Christianity: Obsession with dogma in the *Dark* and *Middle Ages* reached extreme standards, i.e., the pointless argument over "universals". **Abelard** (1121) and **Aquinas** (1273) were pioneers of the Scholastic school of philosophy, the attempt to explain and define Christian doctrine using Aristotelian logic to devise a coherent system of traditional thought, or applying logic to dogma. Unlike **Plato**, scholastics said concepts like "good" or "free" were wrongly considered reality.
- c.1000 Astronomy: **Ibn Yunus** (c.950-1009), Egyptian mathematician and astronomer, made astronomical observations with an astrolabe 1.4 meters high, so precise that 19th century astronomers relied on them.
- 1020 Physics / Optics: The most brilliant of the Muslim scholars in Toledo was **ibn al-Haytham** /

- al-Haytham Optics** **al- Hazen** (965-1039) who recognized that each point of an object reflects *into* the eye. Light goes straight but can be reflected or refracted. **Pythagoras** and **Aristotle** had thought vision was something emanating *from* the eye. **Al-Haytham** said that was absurd. He wrote *The Treasury of Optics*, seven volumes (1011-21), the definitive work on optics until **Newton**. He explained how lenses worked, described the structure of the eye.
- Fermat's principle of least time** He studied and wrote about mirrors, made parabolic mirrors (600 years later used in reflecting telescopes), said light entering a denser medium bent toward the perpendicular as it slows down, invented the *camera obscura* (sometimes called a pinhole camera.) He did the first serious study of lenses. He studied refraction in lenses. He said the speed of light was finite (like **Biruni** and **Avicenna**). He discovered **Fermat's** principle of least time (Light travels between two points over the shortest time path.)
- Haytham Scientific Method** **Haytham's scientific method** was 1. Observe, 2. State problem, 3. Form hypothesis, 4. Analyze experimental results, 5. Interpret data into a conclusion, 6. Publish the findings. He said, "Therefore, the seeker after the truth is not one who studies the . . . ancients and . . . puts his trust in them, but rather the one who suspects his faith in them and questions what he gathers from them, the one who submits to argument and demonstration, and not to the sayings of a human being whose nature is fraught with all kinds of imperfection and deficiency." "So the duty of the man who investigates the writings of scientists is to make himself an enemy of all that he reads, and, applying his mind to the core and margins of its content, attack it from every side. He should also suspect himself as he performs his critical examination of it, so that he may avoid falling into either prejudice or leniency."
- al-Haytham rainbows** **Haytham** erred on rainbows as he accepted **Aristotle's** explanation. He laid the foundation for all future work on optics, including the microscope (not invented until c1595). He discovered the laws of refraction. He discussed the theory of attraction between masses (later called gravity), and was aware of the magnitude of acceleration due to gravity. He deduced that the heavenly bodies were controlled by the laws of physics. (See 1799-**Laplace**) He said that a body moves perpetually unless a force acts on it (**Newton's First Law of Motion**, 650 years later). He also wrote *Doubts concerning Ptolemy*, the then prevailing system of planetary motion. He developed experimental methods of controlled scientific testing to verify hypotheses and theories.
- c.1040 **Math: Al-Jayyani** (989-1079) Cordoba, wrote first treatise on spherical trigonometry (triangles on spheres).
- c.1140 **Math: Bhaskara Acharya** conceived differential calculus, and **Pell's equation**, a proof for the *Pythagorean Theorem*. It proves that division by zero is infinity, computed π , and calculated the time Earth orbits the sun.
- 1046 **Politics:** French King **Henry 3** deposed two pope pretenders and named **Clement 2** pope. So **Clement** crowned **Henry** as *emperor*. Under **Henry 3**, the HRE peaked, from Hamburg to Sicily to Hungary.
- 1054 **Great Schism splits Christianity Latin vs Greek** **Christianity:** Patriarch **Michel 1** in Constantinople closed Latin churches. Pope **Leo 9** in Rome, then a prisoner of the Normans, sent Cardinal **Humbert** to negotiate with **Michel** to open the churches. **Leo** died in captivity. **Humbert** didn't negotiate; he "excommunicated" **Michel** and his associates. **Michel** then "excommunicated" **Humbert** and his associates. This *Schism of 1054* officially split the Church into Latin and Greek parts forever. Their mutual disdain had grown over the centuries. **Augustine** was the dominant influence in the Latin West, The Greeks in the East. (Their mutual excommunications were lifted in 1965.) *The Investiture Dispute* (who may appoint church officials) (ref. 787), was then the most significant conflict between civil authorities, kings / princes, and the Church. It intensified when Pope **Nicholas** decreed only cardinals could elect a pope, and a Church council said laity could no longer elect bishops or abbots, as had been the custom. Usually, only the clergy could read; kings usually couldn't. (More 1073). Belief in miracles, witchcraft, and relics was universal.
- Biggest business in the West, totally corrupt** The Church was the biggest business in the West, collecting money for performing sacraments, weddings, offerings, selling indulgences, rents of Papal lands, sale of bishoprics and cardinalships. Selling a bishopric was lucrative for a king or the Church, and a good buy for the "bishop" who bought his position and then sold parishes to priests who charged for their services. Simony was of course a sin. Bishops and cardinals were often princes with huge estates. Most importantly, the Church had a monopoly on one's going to Heaven or Hell, marriages, forgiving sins, extreme unction. Only a priest

could perform the miracles of the Mass. Despite the corrupt clergy, the spirit of **Jesus** inspired many.

Corrupt to the core 1059 **Christianity: Peter Cardinal Damian**, an emissary of the pope, saw that every cleric of every rank in Milan had sold Church privileges. He declared all natural philosophies (sciences) “absurdities” and “fooleries”. **Damian** said, only celibates can devote themselves fully to the Church. His *On Divine Omnipotence* said that God can do things contrary to the law of contradiction and can undo the past. this. 200 years later **Aquinas** repudiated this. It is forgotten now.

c1060 **al-Zarqali** **Astronomy: Abu Ishaq Ibrahim ibn Yahya al-Naqqash al-Zarqali** (1029-87), in Toledo, an instrument maker and the leading theoretical and practical astronomer of his time, wrote about an instrument to determine planets’ positions. He perfected a land astrolabe and corrected **Ptolemy’s** calculation of the length of the Med.

c.1060-95 **China: Shen Kua** (1031-95) wrote advanced treatises on agriculture, archeology, cartography, geology, math, medicine, metallurgy, meteorology, music, painting, zoology, climate change, and the classics. Chinese used printed paper money and movable type by c.1041.

1066 **William of Normandy** (1027-87), son of Duke of Normandy, invaded England, defeated English king **Harold** at Hastings, became king. Normans introduced a single set of common laws & professional judges.

1066 **Omar Khayyam** (1038-1123), *The Rubaiyat*, deduced how to solve cubic equations (power higher than two).

c.1070 **Law**: “Going to the law” meant having a priest pray for advice, trial by fire, trial by drowning, or seeing an astrologer. The Roman laws had been lost for centuries. Around 1070, a digest of **Justinian** laws was found in a library in Ravenna or Pisa. This made Roman law available to the people, who could then deal with it in a rational way, a tremendous step forward.

1073-76 **Church can’t err.** **New Pope Gregory 7** wanted a religious society, run by a secular arm and a religious arm, who were to cooperate. He required parish priests (then normally married with families) to be celibate to prevent them from passing church lands to their sons. Bishops normally had mistresses and children (called “nephews.”)

Gregory’s reforms took centuries to be fully enforced but mainly just drove clerical sex underground.

His *Dictatus* (1076) stated that the Church never erred and never would until the end of time, and decreed that popes can’t be judged by humans. Discrimination against Jews was common.

1073 **HRE defunct.** **Investiture dispute, Holy Roman Empire disintegrated: Gregory** told the French HR Emperor **Henry 4** (1050-1106), that he could not appoint bishops. **Henry**, defying **Gregory**, appointed his chaplain as Bishop of Milan. **Gregory** excommunicated **Henry**. The German dukes sided with the pope against French HR emperor **Henry**.
It’s the money The dispute led to 50 years of civil war in Germany and the disintegration of the HRE. Due to **Gregory**, the Church in the West was unified and directed from Rome. Its dominant men were Italian, Spanish, or from South France; their education classical; the liturgy was in Latin. **Gregory** in Rome said only the bishop of Rome could be called “papa /pope”.

1076 **Anselm** **Theology: Anselm** (1033-1109), was Italian, a Benedictine monk, Archbishop of Canterbury, and a father of scholasticism (the attempt to apply **Aristotle’s** logic to Christian dogma). On *Original Sin*, **Anselm**, like **Augustine**, said anyone who dies unbaptized, including babies, will go to Hell.

Ontological Argument **Anselm** devised an *Ontological Argument* for God. [arguments that derive from sources apart from observing the world, i.e., from reason alone]. He started his proof for God by assuming a perfect being. “Lord, thou art a being of which nothing greater can be conceived. God exists in the understanding. If God exists in the understanding, we could imagine Him to be greater by existing in reality. Therefore, God must exist.” **Anselm** thus defined God as perfect in every way, loving, omniscient, omnipotent, etc., the Christian position today. He said, like **Augustine**, “I believe so that I may know.” I do not know so that I may believe (**Abelard** (1121) said the reverse.).

Anselm debunked **Monk Guanilo of Marmoutier** quickly pointed out **Anselm’s** error. He stated, “We have in our mind the *idea* of a perfect island. Such an island must exist, as, if it didn’t, it wouldn’t be perfect.”

Anselm’s Reply **Anselm** replied that his theory only works for God. One can conceive of a perfect island that does not exist but not a perfect *being*. Another error seen centuries later by Kant: “**Anselm** put *existence* into the definition of the most perfect conceivable being. To then say “God exists” restates the definition.”
Kant killed it **Aquinas** also rejected **Anselm’s** argument. (see 1269). **Anselm** was later canonized.

1085
Toledo
Library
revived
Western
learning

Natural philosophy: Toledo fell to the Christians (in a friendly takeover), and its huge library, a literary treasure, including **Aristotle's** works, became available to European scholars flocked to Toledo, including **Adelard of Bath**.

Adelard translated Arabic works on meteorology, optics, acoustics, and botany, and **Euclid's** *Geometry* from Arabic to Latin and brought them to Europe. This huge body of knowledge began the revival of learning in the West, scholasticism, applying logic (**Aristotle**) to Christian dogma.

Scholarship
revived in
the West

Adelard's exposition of **Aristotle's** rational secular approach that he found in the Arab texts influenced European scholars. He wrote about the astrolabe.

Then more Christian and Jewish translators in Toledo and Seville put Arabic texts into Latin. Arabs thus gave numerous Greek and Arabic scientific works to Europe.

In 1088, students organized what became the Univ. of Bologna, largely to study law. Bologna was relatively independent from the pope and the emperor and became a center for teaching law.

al-Ghazali
opposed
natural
philosophy
(science)

The reintroduction of Greek learning to Europe appeared first as Latin translations of *Islamic* texts, either original Arabian works such as **al-Khwarizmi's** *Algebra* and **al-Haytham's** *Optics*, or as Arabic translations of, and learned critiques of **Aristotle**.

Muslim theologians, quoting **al-Ghazali** (1058-1111), the then leading theologian of *Islam*, hindered Muslim efforts at free inquiry by limiting scholarship to studying the *Qur'an* and *Hadith*.

Ghazali
crippled
Islam

Al-Ghazali's most important book was *The Recreation of the Sciences of Religion*. It is a blend of dialectic, mysticism, and pragmatism. It has largely shaped Islam as practiced today. It declared that one must renounce all illusions and open oneself to Allah. He urged ignoring all secular learning, even math.

He denied
cause and
effect

Al-Ghazali was the earliest philosopher to deny the necessary connection between cause and effect.

He wanted to prove that miracles are possible, that God can intervene in the natural setting of causes and effects. (Miracles are defined as divine interventions in the natural world.)

He said that the world is sustained and governed through direct intervention of a divine primary causation. As such, the world is in a constant state of recreation by God.

Al-Ghazali distrusted human reason. He wrote *The Incoherence of the Philosophers*, which condemned Muslim philosophers, particularly **Avicenna**, for advocating doctrines contrary to Islam. **Al-Ghazali** also posited a *Cosmological Argument* for Allah, based on the impossibility of an infinite regress of causes.

Also said, "Man's nature is made up of four elements, which produce four attributes, 1. the beastly, 2. the brutal, 3. the satanic, 4. the divine. In humans there is something of the pig, dog, devil, and saint.

Muslims
devised a
scientific
method:
had paper
and papyrus.
al-Ghazali
stifled
science

Muslim scientists laid the foundations of modern science with their showing their *scientific method* and a modern empirical, experimental, and quantitative approach to inquiry. Muslims had paper and papyrus.

Western scholars' parchment (skin of young sheep and goats) was expensive and scarce.

Arab scholars thought Europeans crude. At the time, in many ways they were. But so were most Muslims. The Golden Age of Muslim science ended due to al-Ghazali and the establishment of the theological seminary *Nizamiyah* in Baghdad. Like the Christian Church, **al-Ghazali** retarded the scholarship of hundreds of millions of people for hundreds of years. Science in Islam has not recovered.

1090 Technology: Although basic science stagnated during the Dark and Middle Ages in the Christian West, technology advanced. As towns developed, piracy evolved into trade. Europe had no paper, needed for scholarship. Latin was the language of Western scholars, i.e., clergy.

c.1095 Christianity: Average sinners who died were "purified" in Purgatory for varying periods to qualify for Heaven. (The *Old Testament* described some dead in a period of atonement.) Priests assigned Venial sins to varying periods time in Purgatory. A moderate sinner could easily incur a debt of 300 years in Purgatory.

Selling
Indulgences

German pagans had a custom of paying money to pay the penalty for a crime. The Church adapted this to selling indulgences which forgave various sins at prices depending on the sin, and to reduce one's future time in Purgatory. One year of Purgatory cost 26 solidi of silver, or, if one couldn't pay, 3,000 lashes. Bishops became great landowners and feudal lords, from bequests and selling indulgences until the pope took over the business.

It's the
Money

Selling indulgences showed the corruption of the Church for several centuries. (See 1517-**Luther**.) **Robert Ingersoll**: The Church has always been willing to swap off treasures in heaven for cash down.

1095 The Crusades 1095-1270: were a series of Christian military expeditions during almost two centuries against the Muslims in the Mid-East. That period in history exhibited the most ignorant popes,

widespread avarice, recklessness, indiscriminate cruelty, greed, wantonness, and miscalculations.

Crusades Specifically, **Urban 2** (1035-99) at the *Council of Clermont* called for a holy army to defeat the Muslims who had captured the Holy Sepulcher in Jerusalem. He promised absolution for all sins, and cancellation of debt, pardon for criminals, and indulgences, for those who would fight the Muslims. **wanton destruction** It caused a killing fervor in all Europe. Poor Sinners joined by the thousands to kill Muslims.

Urban also decreed that those who died in fighting in the crusade would be martyrs and go to Heaven, like the *Qur'an's* promise to Muslims. He declared that some wars could be deemed as not only a *bellum justum* ("just war"), but could, in certain cases, rise to the level of a *bellum sacrum* (holy war). Christian mobs on the way to Palestine slaughtered thousands of Jews and stole their wealth. There were seven crusades (1095 to 1270) plus the most successful, the crusade against fellow Christian Cathars.

Crusaders killed everyone 1099 Crusaders captured Jerusalem, torturing and slaughtering 30,000 to 40,000 Jews and Muslims. A Christian knight, Count **Raymond of Agiles** wrote, "[We] did not spare the women and children. Not one of them were allowed to live. The horses waded in blood. It was a just and wonderful judgment of God." The Crusaders set up a kingdom in Jerusalem (which fell to **Saladin** in 1187). **Urban 2's Pax Ecclesiae / Peace of the Church** banned fighting near churches, harming clerics, pilgrims, women, or peasants.

Abelard's great idea, bad intent makes an act a sin 1121 Christianity: Pierre de Pallet / Peter Abelard (1079-1142), from Brittany, theologian, poet, philosopher, defeated his master, **William de Champeaux**, in debate, forcing **Champeaux** to change his view. **Abelard** won arguing that *Nominalism* (abstract terms, universals, represented no objective real existence but were mere words, names). *Nominalism* discredited *Realism* (concepts like colors were real things) until then dominant. **Abelard's great idea: God considers the intention of a deed makes the deed a sin.** This is the Catholic position today. (In law, most crimes require proof of intent (*mens rea*) for conviction.)

Sic et Non 1122 **Abelard** wrote *Sic et Non / Yes and No*, a collection of 188 apparent contradictory quotations from Church officials on many aspects of Christian dogma, using **Aristotle's** dialectic for reconciling the contradictions. Said, "By doubting, we come to examine, and by examining, we reach the truth."

He was the most popular teacher of his day. He made Paris the intellectual capital of Europe and center of Christian dogma and dialectic. For using reason, the Church declared *Sic et Non* and him heretical.

Outwardly, he was orthodox, but the underlying theme in his writings was to prefer reason over faith. **Abelard** said, "I must understand in order that I may believe." (The converse of **Augustine** and **Anselm**).

He loved and secretly married a student of his, **Heloise**. **Abelard** was the hero of the love-passion, i.e., love frustrated by tragic obstacles. They named their son **Astrolabe**.

After many travails, he founded a convent at Paraclete, where he installed **Heloise**. She later became abbess. Their love letters were later published to great admiration.

Abelard's Rules of Argument **Abelard** applied Aristotelian logic and dialectic of logic to the scriptures. Like **al-Haytham**, he had basic rules for argument and investigation that advanced the *scientific method*, namely:
1. Systematically doubt and question everything.
2. Learn the difference between statements of rational proof and those merely of persuasion.
3. Be precise in the use of words, and expect precision from others. 4. Watch for error, even in Scripture.

1122 First Lateran Council: Rome. Priests can't marry, cohabit, sell Church benefits. their marriages void .

c.1130 Learning: Hugh of Saint Victor, in Paris, said that secular learning of the natural world was a necessary grounding for religious thinking. "Learn everything, later you will see that nothing is superfluous."

Priests may not study Roman law 1139 Second Lateran Council: Rome. **Innocent 2** called this council to minimize effects of the *schism* which had arisen after Pope **Honorius 2** died and the "election" of antipope **Anacletus 2**, a rival of **Innocent 2**. It repeated the *First Council's* canons, priests couldn't marry, co-habit, or study Roman law, told the clergy to dress modestly, prohibited jousts and use of the bow and arrow or crossbow against Christians, and condemned usury.

Celibacy was required of bishops to prevent them from leaving their property and wealth to their sons. The papacy was a family business: Before 1000, 11 popes were sons of popes or priests. After 1139, only six popes were known to have children, all in the 1400s and 1500s.

Eastern Orthodox priests could marry.

1140 **Law:** **Gratian**, a Bolognese jurist, wrote a lawyer's textbook, *Decretum, A Concordance of Discordant Canons*, which unified the various Canon law decisions by various bishops. It reorganized and rationalized Church law. He put some reason into canon law. He was influenced by **Abelard's** *Yes and No*, with cases discussing the pros and cons with **Aristotle's** rules of argument. Blind local custom was done away with.

1140 **Christianity:** Belief in the Christian God was, in the West, near universal until the *Enlightenment* in the 17-18th century. There was always a small community of non-believers and Jews, and the *Problem of Suffering / Evil* was known to theologians. *Dogma*, i.e., beliefs regarding a particular supernatural entity that controlled natural events, however was *not* a cultural universal. Dogma is a subset of supernaturalism (belief in an invisible supernatural force) that developed to present Christian supernatural beliefs as truth rather than the pagan supernatural beliefs of the Greeks and Romans.

c.1140 **Theology:** **Bernard** (1090-1153), from a noble family, founder and Abbot of Clairvaux Monastery, criticized **Abelard** for presuming to understand God by reason. He pronounced himself "visionary of the century," as he had been selected by God to guide Christianity along the right path.

He was a religious fanatic, slept in a small cold cell. He said that knowledge was only justified when it promoted purification of the soul. Like **Victor Hugo's** *Javert (Les Miserables)*, **Bernard** pursued **Abelard** relentlessly and convinced the pope to confine **Abelard** in a monastery.

1146 **Second Crusade**
Killing was to Christ's profit
Pope **Eugene 3** called the **Second Crusade**. It began with Christians massacring Jews in the Rhineland. **Bernard of Clairvaux** said, "A Christian glories in the death of a Moslem because Christ is gloried." He wrote, "The knight of Christ may strike with confidence and die yet more confidently; for he serves Christ when he strikes, and saves himself when he falls . . . When he inflicts death, it is to Christ's profit, and when he suffers death, it is his own gain. The crusade was a total failure. **Bernard** was made a saint. The Crusades brought new ideas into Europe simply from contact with a different culture (such as windmills from Persia, (one was known in England in 1185)). The Crusades were the first examples of overseas imperialism; they gave Christianity a militant tone. Islam already had one.

c.1147 **Surgery:** **Abu Merwan Abdal-Malik ibn Zuhr** (1091-1161), the father of experimental surgery, introduced methods of dissection, invented the tracheotomy, gave the first accurate descriptions on neurological disorders. He wrote an early pharmacopoeia, discovered the causes of scabies and inflammation and, with **al-Zahrawi**, invented anesthesiology (unknown outside Islam.).

1147+ **Christian heretics:** Cathars, a *Gnostic* Christian sect widespread in Southern France, believed in purifying themselves, clean living, chastity, poverty, vegetarianism, no priestly hierarchy, no war, no capital punishment, and equality of the sexes. It was a dualistic system; things of the spirit were created by God and were good. Evil things were created by Satan. Man's soul, a good, was trapped in Man's evil body.

They thought that the organized Church (Rome) was evil. The Cathars were the first mass heretical movement after 1000 to seriously threaten the Church's bureaucracy, simply by denying the need for Vatican oversight. So, popes, starting with **Eugene 4** in 1147, moved to crush them.

c.1150 **Science:** **Abu al-Walid ibn Ahmad ibn Mohammed ibn Rushd** (1126-1198), **Averroes** to Westerners, was a religious judge in Cordoba. He came from a family of religious judges. He wrote on philosophy, theology, medicine, astronomy, physics, psychology, mathematics, Islamic jurisprudence and law, and linguistics. He wrote more than 100 books and treatises, He wrote clear analyses of Aristotle, becoming known in the West as *The Commentator*. He corrected many of **Avicenna's** commentaries.

How we think
He believed that people think by abstracting the forms behind things, and that the human intellect is the receptacle of these "intelligible" forms. He was the first person known to notice that no person gets smallpox twice, an observation that led to immunization. He realized the function of the retina. He said that philosophical knowledge came from reason, not faith.

Aristotle revived
Averroes's ideas exerted an important influence on Medieval *Christian* thinking, not Muslim. He called for a return to **Aristotle's** belief to study nature. He developed the teachings of **Aristotle** on lines that made a sharp distinction between religious and scientific truth, and so prepared the way for freeing scientific research from the Christian and Muslim dogmatism that strangled it. He said the soul was mortal and that philosophy and the *Qur'an* implied that the world and God had always existed.

Cosmo-logical Argument
Averroes advanced a *Cosmological Argument* for God, the *Kalam* argument, "God is the eternal, unmoved First Mover, who exists necessarily by his own nature and who generated the first created being. The First Intelligence created the second intelligence and also the first celestial sphere . . . to the Tenth Intelligence."

- Religion for the masses; philosophy for the educated** **Averroes** and **Avicenna** achieved an important unification of religion and philosophy by envisioning the universe as a series of emanations from Allah, from the first intelligence to human intelligence. So they claimed that there was only one truth, that appeared like two truths, religion for the uneducated masses and philosophy for the educated elite. Said studying science was necessary to understand religion. They wanted to infuse Islam with natural philosophy, i. e. reason. Their quest was in vain. *Islam* was as God-obsessed as Christianity, and not receptive to change regarding non-spiritual matters. **Averroes** said **Plato's Republic** described the ideal state. (More **Averroes** 1197)
- Paper making** Technology: How to make paper reached Europe only around 1150 through Muslim Spain. (See 751-Arabs) China had used printed money, explosive grenades, and built far bigger, better, more reliable sailing ships than Europeans. Communications between anyone, much less scientists who would benefit by trading ideas, was very slow. Hand copied letters were still the only form of written communication. Books were rare treasures; as hand copying was expensive, even though done by monks or slaves. Knowledge was thus largely memorized, not efficient
- 1150-1250 **Freemasons** Overview: After 1000, a spirit of optimism caused numerous cathedrals to be built in France (costing 25% of GNP), the greatest civil works since *Hagia Sophia*. No comparable projects were built until the 19th century. The skilled men who knew how to build them called themselves freemasons, and were the elite of workmen. As the horse transformed warfare, the landowner (horse owner) was the most powerful warrior (and vice-versa). Murder was common. Merchants were the first to want rational factual information.
- Merchant towns became independent** Overview: A new class of urban merchants contributed to the new prosperity. Monasteries and convents proliferated. Water mills and windmills began to harness energy for commerce. Paper began to be made from rags. The use of iron became common, even in workers houses. An urban wage laboring class developed. Merchant towns won self government. All these factors threatened the *Medieval* theocracy. Wandering troubadours sang of chivalry and courtly love (for nobility only. It was too delicate for peasants.) Traveling entertainers, *jongleurs* /minstrels, brought news in the form of stories or poems. Translations of **Aristotle** into Latin were beginning to be available to those few who could read. (Greek had been largely forgotten among the small segment of educated persons in the West).
- Mortal Sin to miss mass** - The Vatican decreed that missing Mass was a mortal sin, unless forgiven, *eternal* fiery torture unless one publicly worships him every week. This seems to reveal God's character more than Man's. Africa: The Black African Mali empire had slave plantations as cruel as those later in the Americas.
- c.1150-1350 **Scholasticism** Scholasticism was a method of critical thought which dominated teaching in universities in Europe from about 1100 to 1700. Scholastics wanted to offer scientific / rational proofs for theological issues, such as God's existence (**Aquinas** 1269+). Its four characteristics:
 1. It was confined within the limits of orthodoxy. 2. **Aristotle** became increasingly accepted as the supreme authority. 3. There was a great belief in "dialectic" and in syllogistic reasoning. 4. It was discovered that **Aristotle** and **Plato** did not agree on the question of universals. The downside to dialectic was the belief in reasoning on matters that only observation could decide..
The astrolabe, originally a Greek invention that shows one's latitude, finally came to Europe from the Arab East. It was adapted for sea travel, with the magnetic compass, became a *system* for navigation.
- A magic show** The Christian Mass was a show of magic, the priests dressed in splendor, in an ornate setting, with incense, holy water, speaking Latin which peasants did not understand, magically changing a wafer and wine into the flesh and blood of **Jesus** (*transubstantiation*), describing eternal torture in Hell for non-obedience and instructing the people how to be saved from Hell (i.e., obey the priests). The people were ignorant and illiterate, so Church paintings were used to tell scripture stories. Peasants had no bibles so the Mass and the priest were their only contact with God.
- People lived in constant intense fear of Hell.** The concept of sin dominated people's minds every waking moment. Most people lived in constant intense fear of sinning accidentally and going to Hell for eternity. For the clergy, of course, that was the whole point. Such belief ensured the clergy's authority. Questioning certain Christian beliefs was sinful. Belief in witchcraft was widespread even though believing in any other supernatural belief systems (like witchcraft) other than Christianity was a sin. (**George Smith**: By placing a moral restriction on what one is permitted to *believe*, Christianity declares itself an enemy of truth and reason.)
- 1154 Geography: **Abu Allah Mohammed al-Idrisi** (1099-1165) drew the most accurate world map Europe, Asia, the Med, North Africa were then known, the Americas, the Western Hemisphere, was not..

- 1158 **Habitas, Education** HR Emperor **Frederick 1** (1122-1190), issued *Habitas*, an academic constitution confirmed by the pope. It was the basis of academic freedom. Universities founded, all Christian: Cambridge 1209. Salamanca 1218. Padua 1222. Naples 1224. Toulouse 1229. Orleans 1235. Siena 1240. Valladolid 1241. Montpellier 1289. Lisbon /Coimbra 1290. Alcala 1293.
Pope **Alexander 3** c.1170 forbade clergy to study physics; so, effectively, no one in the West did.
- 1168-78 **Maimonides** Judaism: Moses Maimonides / Moshe ben Maimon (c1136-1204), born in Cordoba, a Spanish rabbi, a contemporary of **Averroes** in Cordoba, was the greatest figure in Jewish history after **Moses**. He was a codifier, judge, and commentator on the *Bible* and *Talmud*. He compiled all the laws of Judaism.
In 1148, Berber Muslims took over Cordoba, forced Jews to convert or leave. His family left. For ten years he moved around Southern Spain, spent time in Fez, Morocco, and in 1166 eventually settled in Cairo. From 1168-78, he rewrote and organized the *Torah* as the *Mishneh Torah*. Judaism had no established principles of faith like the Christian *Nicene Creed*. :
- Principles of Jewish belief** Maimonides proposed 13 principles of Jewish belief, specifically: 1. God exists. 2. God's unity and indivisibility into elements. 3. God's spirituality and incorporeality. 4. God's eternity. 5. Only God should be worshiped. 6. Revelation through God's prophets. 7. **Moses** is the preeminence prophet. 8. God dictated the *Torah* to **Moses** and it is divine. 9. The *Torah* is permanent and will not be changed. 10. God is aware of all human actions and thoughts. 11. Reward of righteousness and punishment of evil. 12. The coming of the Jewish Messiah. 13. The resurrection of the dead.
These principles were controversial as Judaism was largely non-creedal. He said, "Astrology is a sickness, not a science." Regarding the Problem of Evil, he argued that everything God does is absolutely good so He did not make any evil.
He argued that God existed because: Everything in the universe is finite, so there has to be an infinite power to push the motion of the finite matters, (More **Maimonides** 1186.)
- His argument for God**
- 1179 Third Lateran Council, Rome: It decided only cardinals could elect the pope; it condemned usury, sodomy by priests, plundering, and tournaments. Clergy couldn't have women in their houses, or charge money to perform burials or marriages. Jews couldn't have Christian servants. Evidence of Christians was always to be accepted against Jews in court.
- 1182 Christianity: King **Philip 2** expelled Jews from France and stole their property.
- 1184 **Bishop-led Inquisitions** Christianity: Before 1200, the prosecution of heretics was divided between the bishop and civil authorities. The bishop accused and the civil magistrate tried and punished.
Pope **Lucius 3's** bull, *Ad abolendam / To do Away With*, instituted bishop-led local inquisitions to punish heretics, with torture, burning at the stake, and / or imprisonment.
It's the money. Inquisitions were immensely profitable for the bishop; he confiscated all a heretic's property. Even dead people were dug up, tried, convicted, and had their property taken from their heirs.
- 1184 **Cathars, good Christians, but didn't think the Vatican was necessary** Cathars (ref.1147) in South France worshiped **Jesus** but didn't want to be subservient to the Vatican. So were declared heretics. The various bishops's inquisitions punished supposed heretics and witches, often more cruelly than heresy. These inquisitions were not effective, as bishops often lived in Rome and didn't visit their bishoprics often.
The right to know one's accuser often led to the accuser's death. Trials / punishments for heresy were common and institutionalized in the *Episcopal Inquisition* (1184-1230s), the *Papal / Holy Inquisition* (1233+), the *Spanish Inquisition* (1478-1834), and the *Portuguese Inquisition* (1542-1860). In 1187 Sultan **Saladin / Salah al-Din** recaptured Jerusalem. .
- c.1186-90 **Maimonides** Judaism: Maimonides (ref. 1168) His *Moreh Nebuchim / Guide for the Perplexed*, sought to show that the teachings of Judaism were in sync with Aristotle's basic laws of thought and offered insights that reason alone could not obtain. He said, "God has no attributes."
Proof outranks the Hebrew Bible The *Perplexed* were those who had studied Jewish law and those who had learned what philosophers and scientists had said about the *Hebrew Bible's* anthropomorphic God(vain, vicious, etc.). He tried to explain the *Hebrew Bible's* contradictions and obscure parts. His *Guide* was essentially midway between prophesy and rationalism. Said, "When a biblical verse is contradicted by proof, proof prevails."
- 1186-90 His *Guide* cited **Plato**. He said, "Thou shalt not kill" and "Love thy neighbor as thyself " were

Maimonides: admonitions that applied only to fellow Jews. He said don't take literally the *Pentateuch* (the first five books of the *Hebrew Bible*, *Genesis*, *Exodus*, *Leviticus*, *Numbers*, and *Deuteronomy*). He believed that the *nature* of God was unknowable. He said astrology was a disease, not a science. He said most religious people were ignorant. Though Orthodox, his writings were consistent with secular Judaism. **Maimonides** was among early Jewish scholars who received **Averroes's** works enthusiastically, saying he "received lately everything **Averroes** had written on the works of **Aristotle**" and that **Averroes** "was extremely right". **Averroes** said religion and philosophy are compatible.

Maimonides liked both **Aristotle's** idea of an eternal universe and the *Hebrew Bible's* idea of God creating the universe. He said that one could only know that God exists, but could not say any other positive things about God, just attributes of things that he was not. He taught that the idea of a God that one could say positive things about was simply wrong. His writings spread across Spain and Southern France and inspired a burst of Jewish philosophy for centuries.

He said, In science, the important thing to do is to change your ideas as science advances.

Cabala Judaism: The great Jewish mysticism, *Cabala / Kabbalah* grew out of **Maimonides's** ideas. It was a melding of his idea of the total unknowability of God with *Gnosticism*, Neo-Platonism (ref. AD 230), some ancient Eastern mythology, and *Hasidism* (means *the devout*).

Jewish *Kabbalah* is a set of esoteric teachings meant to explain the relationship between God, the unchanging, eternal, and mysterious *Ein Sof* ("the Infinite"), and the mortal and finite universe (God's creation). It is the foundation of mystical religious interpretations within Judaism.

It asserts that every word, letter, and number in the *Hebrew Bible* can reveal mysteries through cabalistic interpretation. Orthodox Jews said that **Maimonides** had abandoned Judaism, deprived God of his attributes, and denied the possibility of creation.

Problem of Evil / Suffering **Maimonides** addressed *the Problem of Evil*. In his *The Guide for the Perplexed*, he assumed a God, wrote that the evil within humans stems from their individual attributes. Good comes from a universally shared humanity. Evil was merely the absence of good.

God did not create evil, He created good. Good is divine invention. Evil comes secondarily.

Natural evils balance between life and death. He said that there are three types of evil: evil caused by nature, evil people do to others, and evil man does to himself. Natural evil is the most necessary-the balance of life and death in both the humans and animals and is essential to God's plan. Evil to others is relatively rare, and people bring it upon themselves. The evil people do to themselves is the most common. It is due to man's falling victim to his physical desires. One must learn how to ignore his bodily urges.

1197 **Averroes** (ref. 1150) had a long, prominent, and varied career in Spain and Morocco, principally in Marrakesh, writing on numerous subjects. He urged philosophers to share their doubts with others.

He was far more influential in Jewish and Christian thought than in *Islamic* as he was condemned by Muslim clergy, citing **al-Ghazali** (ref. 1085) who had written *The Incoherence of the Philosophers*.

Averroes had responded with *The Incoherence of the Incoherence*. Said, "The being of existent things is inseparable from their essence." A Muslim mob burned his books. He fled Spain, died in 1198 at 74 . .

1198 **Averroes's** students fled to Padua to continue his philosophy of empirical investigation of a rational world. Padua was protected by nearby Venita/Venice, anti-pope, anti-clerical and an equal of Constantinople or Paris. Franciscans generally favored **Averroes's** ideas; Dominicans (with **Aquinas** 1273) attacked him.

Last and greatest Muslim scientist **Averroes** was the last and greatest of Arab Aristotelians. He said that there was one eternal truth which could be comprehended through the *Qur'an* or by natural knowledge, with the aid of **Aristotle** and other philosophers. He rejected theological control of philosophy. "Knowledge is the conformity of the object and the intellect." He wanted *Islam* to consider women equal to men. No success. **Maimonides** (1168) taught **Averroesism**.

Islam is indifferent to science. There have been no significant scientific advances from *Islam* for almost 800 years. Muslims have translated virtually no scientific texts into Arabic for 1,000 years.

Science and social equality under Islam is mired in *creationism*, denying evolution. The seventh century mentality and knowledge in the *Qur'an* stifled science in Muslim lands. So Islamic countries have been left behind other Western countries, a cause for shame, crucial in Islamic dogma.

1198-99 **Christianity** **New Pope Innocent 3** regained control of the Papal States. His reign was the high point of papal power. He nominated HRE emperors. He made King **Philip 2** take back his queen as **Philip** had

- ruled** unjustly divorced her; he made another king divorce as his wife was too closely related to him.
He gave **Peter of Aragon** a kingdom as a fief. He sent **Dominic de Guzman**, a Spanish bishop to convert the *Cathars*. **Dominic** said that only priests who displayed genuine humility and zeal could convert the Cathars. (More Cathars 1202, '08-9, '15. See 1216, **Dominic** founded Dominicans.)
- 13th Century** National epics were written in the local languages, *Beowulf*, England 900. *Edda*, Scandinavia 1100. *Cantar del Cid*, Spain 1140. *Perceval*, France 1175. *Nibelungenlied* Germany 1205. *Chanson de Roland*, France c.1200 (a brave general of **Charlemagne** is killed by Saracens). *Parzival*, Germany 1210, (based on the French *Perceval*.)
- National epics**
- Three eras of history** Theory of History: Joachim of Fiore (an abbey in the mountains of Calabria that **Joachim** founded) (c1136-1202), an Italian mystic, posited three eras of history,
1. *Age of the Father*, pre-**Jesus**, where one obeyed God.
2. *Age of the Son*, AD 30-1260, when one became the son of God.
3. *Age of the Holy Spirit*, 1260+, when one would be in direct contact with God, reaching the total freedom that Christ preached. **Joachim** said that no clergy were needed.
(In 1263, Pope **Alexander 4** condemned his ideas.)
- Florence ruled business** 1202 Mathematics, business: Leonardo Fibonacci / Leonardo Pisano of Florence brought Hindu-Arabic numerals including the zero and algebra to Christian Europe with his *Liber Abaci / the Book of the Abacus*. His 1220 book, *Practica Geometriae*, applied Arabic numerals to geometry and trigonometry (the math of triangles). Double entry bookkeeping followed shortly and the Florentine gold florin became the monetary standard of most of Europe.
- Fourth Crusade made it to Constantinople.** Christianity: Pope Innocent 3 (ref. 1198) ordered the Fourth Crusade. Said, "The Jews are doomed to wander the earth as fugitives and vagabonds, and their faces are covered with shame." (ref. **Augustine's City of God 18:46**). The crusaders reached Constantinople in 1204, ravaged it for three days, killing indiscriminately, including Christians. They never reached the Holy Land. (More **Innocent 3** 1208-9, '15,)
- Genghis Kahn, Mongols** 1206-41 Mongols, A new wave of tough horsemen under Genghis Kahn / Universal Ruler(1162-1227) burst out of Mongolia changing the nature of warfare. He created the largest empire the world had seen. He conquered Northern China, took Peking in 1214, Persia in 1218, and west to the Caucasus. He was the last great nomad leader in the world. He was ruthless in battle, but also the most religiously tolerant leader in the world. By 1241, the Mongols were stopped only at Vienna. Windmills, first used in Persia c.800 to grind grain and lift water, began to be used in China.
- 1208 Crusade against Cathars** Christianity, Final Solution for the Cathars: Innocent 3 (ref. 1198, 1202) sent **Pierre de Castelnau** to South France to convert the *Cathars* (ref. 1147). **Castelnau** excommunicated Count **Raymond 6** of Toulouse, a protector of the *Cathars*. So a knight of **Raymond** killed **Castelnau**. **Innocent 3** then ordered what became known as the *Albigensian Crusade* against the *Cathars*. He said all property of convicted heretics could be taken. "Nobles" from North France hurried south to join the killing and to grab some land.
- Beziers was wiped out The slaughter was divine.** **Innocent 3** called the Cathars cannibals. **Arnauld, Innocent's** Cistercian abbot commander, led a brutal massacre of the town of Beziers. Afterward, **Arnauld** told **Innocent** that the murders were part of a divinely designed event. "Our men spared no-one, irrespective of rank, sex, or age, and killed almost 20,000 people. Divine vengeance raged miraculously." This slaughter wiped out Beziers. In three decades, the Cathars were wiped out. During their reigns, Christian Inquisitions in Goa, Portugal, and Spain, forced conversions of the local children.
- 1209** Christian schools of thought: Two rival intellectual schools arose during the 1200s as **Aristotle** infused into Western thought. The first school was Franciscan, founded in 1209, favoured by the Vatican, was close to Augustinian and Platonic intellectual beliefs. The other school, closer to **Aristotle** was led by Dominicans. Fear of magic / witchcraft continued in both schools See 1216
- Franciscans** **Francis** of Assisi (central Italy) (1181-1226), a layman, founded a lay order (Franciscans). Monks had to live on what they could beg. "Go two by two, declare to all men peace and penitence." His simple dignity was a rebuke to the princely style of the Church hierarchy and inspired a growth of religious enthusiasm. Said, "Lord, make me an instrument of thy peace. Where there is hatred, let me sow love."

- 1210 **Aristotle banned** Innocent 3 reluctantly recognized the Franciscans. Franciscans manned the *Inquisitions* in several countries) **Aristotle's** influence was so great that he was known simply as *the philosopher*. This posed a problem for the Church. In 1210, a synod of bishops in Paris, with the pope's support, banned a number of medieval theological teachings as heretical, under penalty of excommunication, but most importantly the treatises of **Aristotle**. The other school of thought, led by Dominicans was founded in 1216 by **Dominic** (ref 1198-Cathars)
- c.1212 **Children's Crusade** Christianity: A crusade reputedly inspired and led by a young boy gathered thousands of children walking from German lands to Marseilles, expecting the Med to part so they could march to Jerusalem. The Med stayed wet. Two merchants offered passage on their ships to the children. In 1230, a priest revealed that most of the children drowned or were sold as slaves in North Africa.
- The Crusades were two centuries of foolish debacles.** All nine crusades against Muslims over two centuries, except arguably the first, were disastrous bacchanalias of indiscriminate slaughter, confusion, and anti-Semitism, with tens of thousands of crusaders killed, including many nobles, as well as pagans, Jews, and Muslims. It is unclear whether the Christians murdered more Jews or Muslims. The bloodiest, most "successful" crusade was the crusade against fellow Christians, the Cathars. The crusades to the Holy Lands brought wealth and influence to the mercantile city-states of Italy, who later financed voyages of discovery. The crusades were extensively ridiculed in **Charles Mackay's** 1841 book, *Extraordinary Popular Delusions and the Madness of Crowds*.
- 1215 **Magna Charta** Political Theory: A weak English King **John** was forced by nobles to sign the *Magna Charta*, giving *habeas corpus*, speedy trial, trial by jury, limits on taxes all for nobles, not to the masses. (**Innocent 3** in the name of God condemned it, denounced it as unfair to the king, forbade king **John** to observe it.
- Torture is OK** **Innocent 3** convened the *Fourth Lateran Council*, the most important council of the Middle Ages. It defined transubstantiation, arranged for a new crusade, required annual confession, and communion at Easter, outlawed trial by ordeal among priests. It opened the way for trial by jury in secular trials.
- Extreme anti-Semitism** Lateran 4 officially sanctioned torture by Inquisitors. Said that Jews and Muslims must wear yellow badges so that, *inter alia*, Christians wouldn't have sex with them. Jews couldn't hold public office and had to live in ghettos. The *Council* also decreed that God created the universe out of nothing *Genesis: 1 1-31*. Councils over the centuries decided "eternal" truths by majority vote.
- 1216 **Dominicans** **Dominic** (1170-1221, ref. 1198), a Castillian bishop, ordained 1194, founded the Dominicans to preach the gospel and fight heresy. (Ref 1198-Cathars and 1209-Franciscans) The order grew rapidly, opened schools in university towns. It led the second school of thought with **Aquinas**, **Albertus Magnus**, **Fibonacci**, **Grosseteste**, and **Roger Bacon**. It christianized Aristotle by asserting the superiority of revealed truth over any mere human reasoning. This approach, Scholasticism, preserved central Christian doctrines which could not be rationally proven, but also trusted in reason insofar as it did not contradict Christian truth. It enlarged the concept of reason from pure logic to include observation and experiment. The intellectual power of **Aristotle's** (empirical observation/experimentation) was contrary to **Augustine**. Monasteries were becoming prosperous and corrupt Canonized 1234.
- 1217 **Averroism** Christianity, Averroism: **Averroes's** (ref 1150, '98) clear analyses of **Aristotle** were widely read. He subjected all but divinely revealed truth to the cold light of **Aristotle's** reason. He taught **Aristotle** without seeing the need for or the possibility of coordinating his conclusions with Christian beliefs. Pope **Honorius 3** sent Dominicans (and then in 1230, Franciscans) to Paris to try to stem the tide of free thought. The Dominicans bitterly attacked Averroism (adopted by **Maimonides**), said it was subversive of the merits of the saints, but Averroism was too firmly ingrained in scholarship. **Averroes** and **Maimonides** revived **Aristotle's** philosophy. Jews in Muslim Spain prospered, were scholars, physicians, treasurers managing public finances.
- c1225 **Albertus Magnus taught Aquinas** Science: **Albertus Magnus / Albert the Great** (c1193-1280), was a Dominican in Paris, a center of Church scholars, including the study of the *doctrine of Universals* (the medieval problem of universals is a logical, and historical continuation of the ancient problem generated by **Plato's** theory answering a bundle of questions, namely, his theory of Ideas or Forms.). **Albertus** taught **Aquinas** (1269). He was the first humanist in the Middle Ages, first to separate knowledge from dogma. He stressed importance of observation and experiment, *empiricism*.

Greatest German philosopher and theologian of the Middle Ages

Albertus advocated the peaceful co-existence of science with religion. He sought to synthesize all knowledge from Christian, Islamic, and Jewish sources into his 38 volumes of writings.

He was the greatest German philosopher and theologian of the Middle Ages. Said, "Natural philosophy does not consist in ratifying what others said but to seek the causes of phenomena." "The Earth is a sphere; all things have causes." "The state is an expression of God's purpose."

Albertus suggested sailing west to reach China, and wrote that China used gunpowder to shoot arrows from bamboo tubes. His superiors accused him of sorcery, forced him to stop studying natural philosophy and study only dogma. .

(In 1310, **Dante** made **Albertus's** doctrine of *free will* the basis for his ethical system.)

Science began with Man's trying to learn the causes of events he saw

Natural philosophy: **Robert Grosseteste** (1168-1253), Bishop of Lincoln (Central England)), was the central figure in England in the intellectual movement of the early 1200s. Familiar with **Aristotle**, he described scientific inquiry, said that science began with Man's experience of phenomena and tried to determine the causes / reasons for such phenomena.

Then, to analyze such causes, break them down into their component principles. Then reconstruct the principles into the observed phenomena based on a hypothesis, and finally, verify the hypothesis by observation.

He studied light, optics, astronomy

Grosseteste was one of the first to experiment. He analyzed branches of science showing how some were dependent on others. Optics and astronomy were, for example, subordinate to geometry. Like **al-Haytham**, he wrote about direct visual light rays, reflected light, refracted light, and the formation of a rainbow. **Grosseteste** and his student, **Roger Bacon**, advanced the *scientific methods* of **Khayyam**, **Biruni**, **al-Haytham**, **Avicenna**, and **Abelard**.

Their methods of investigation were more important than their results.

1226 **Francis**, the founder of the **Franciscans**, died in 1226. He was canonized in 1228.

Bertrand Russell recounts that **Francis's** successor, Brother **Elias**, wallowed in luxury, discarding poverty. Franciscans became wealthy and corrupt. (See 1320).

Some Franciscans, called Spirituals, stayed true to **Francis**, said **Jesus** and the apostles owned no property. So many were burnt by the Inquisition.

OK to sell children into slavery

Christianity, slavery: Pope **Gregory 9** (1155-1241) issued *Corpus Juris Canonici* / Body of Canonical Laws (in effect until 1913). Said slavery was legitimate for war prisoners, criminals, those who sold themselves into slavery, children sold into slavery by their father, and children of slave mothers.

1229 Inquisition Anti-learning

Christian fear of learning: *The Council of Toulouse* formed a *Court of the Holy Inquisition*. Only clergy could own a bible. To prevent ordinary people from learning scientific subjects, the Church banned scientific speech in the vernacular languages. In 1231, Parisian bishops forbade people to talk about scientific subjects in vernacular French. Peasants spoke only French.

1233 Christian fear of dissent thinking: In the first half of the 13th century, bishops in Lombardy, the Marches, Romagna, Tuscany, the Balearic islands, Aragon, and cities in France and Germany had established Inquisitions under their control to punish heresy (*thinking* or speaking unapproved ideas.) They were lucrative for the bishops. As inquisitions intruded on civil power, there were frequent jurisdictional disputes between the civil authorities and the Church.

To get the money the bishops were getting, Pope **Gregory 9** established his "Roman" *Holy Inquisition* with Dominicans run it. The Church was relentless), used torture and burning routinely.

It's the money

The Church derived income greater than all the secular rulers combined from its large land holdings, from fees to perform marriages, confirmations, etc, offerings, and from their ecclesiastical courts.

1235 The Mali empire, Muslim, was the largest West African empire, widely influencing the culture of the region through the spread of its language, laws and customs. Its capital, Timbuktu, was a center of Muslim learning and slave trading. It had access to the trans-Saharan trade routes.

1242+ Blood expert

Physiology: **Ibn al-Nafis** (1213-88), an early proponent of experimental medicine, wrote that the heart had two separate ventricles, one pumped blood to the lungs and the other to the body.

He wrote extensively on medicine and philosophy. His works weren't well known in the West until the 20th century. His work on the circulation of blood was not surpassed until **Harvey** in 1628.

1243 Roger

Natural Philosophy: **Roger Bacon** (c1220-c1292) Brit, first a Dominican, then Franciscan, was the greatest scientist of his time. He studied and taught at Oxford. (Note: Details and dates regarding

Bacon, greatest scientist of his time.

his life are uncertain. We cite what is least uncertain.)

He became well versed in **Aristotle**. About 1241, he joined the faculty at Paris to teach **Aristotle**, which had been banned at Paris as non-Christian and was being reintroduced. In his *Compendium Studii Philosophiae*, **Bacon** distinguished between three ways of acquiring knowledge, from authority reason, and experience, but not all three ways have equal value. Authority and reason are not enough for knowledge because relying on authority alone gives belief but not understanding, while reason alone does not distinguish between true sentences and sentences having only the appearance of knowledge

1247 **Bacon** returned to Oxford, studied math and natural philosophy. He suggested lenses to help eyesight. He said to study non-Christian scholars like **Aristotle** and **al-Haytham** (*Optics*). (Next **Bacon** 1257).

Dominicans forbade learning science

Christian fear of learning: Dominicans, (ref. 1215) minimized the study of medicine and natural philosophy. Both the Dominicans and Franciscans condemned research by experiment and observation.

Historian **F J C Hearnshaw** says that during the seven centuries (400 - 1300), "history as a science was unknown. It was used only to supply anecdotes [for clergy to illustrate] their sermons."

c.1250 **Rumi: Use music, dance**

Islam: **Jalal ad Din Mohammed Balkhi**, known as **Rumi**, Persian poet, advocated the use of music, poetry, and dance as a way to reach God. He wrote *Masvani*, an epic poem with fables, scenes from everyday life and *Qur'anic* verses.

1252 Christianity: Pope **Innocent 4** authorized inquisitors to torture *possible* heretics to get confessions. **Bacon** (ref. 1243, '47) became a Franciscan monk. In 1255, the Church allowed **Aristotle's** ideas to be studied at Paris, but experimenting could cost a man his life. He said, "All sciences are connected. They lend each other material aid as parts of one great whole."

1257 Christian fear of learning: **Bacon's** Franciscan order forbade him to teach, ordered him back to Paris to be kept under surveillance in their friary for seeking scientific explanations for matters ascribed to God. **Bacon** postulated, but could not demonstrate, that the colors of a rainbow are due to the reflection and refraction of sunlight through individual raindrops. (More **Bacon** 1264)

Zen doubted the super-natural

1258 Mongol empire: **Hulagu Khan**, a grandson of **Genghis Khan**, led a Mongol army that looted and razed Baghdad, a religious center of Islam. It had libraries, scientific institutions, laboratories, and canals. **Hulagu** killed 200,000-1 million Muslims. The nomadic Mongol warriors settled in their conquered lands, adopting the local religion. The Mongols imposed a *Pax Mongolia*, permitting trade with the West and tolerant of Christians and Muslims. They made Peking (now Beijing) their capital.

Zen Buddhism in Japan

Kubla Khan, another grandson of **Genghis**, ruled China from 1260-1294. **Kubla** rebuilt Peking. "In Xanadu did **Kubla** Kahn, a stately pleasure-dome decree." **Samuel Taylor Coleridge** (1798).

Kubla several times tried to invade Japan. He unified China from Central Asia to Korea.. The Persian, Chinese, and the Ottoman Empires were all larger than Western states.

In the thirteenth century Zen Buddhism (no supernatural powers) as its central tenet, came to Japan and became popular with the Japanese military. (See 1271 and 1380-Mongol Empire)

1264 Christian learning: **Bacon**, while "under surveillance" suggested to Cardinal **de Foulques**, bishop of Narbonne, that he write a book on natural philosophy to benefit the Church. **De Foulques** became Pope **Clement 4** in 1265 and asked **Bacon** to prepare a book with treatises on grammar, logic, mathematics, physics, philology, and philosophy.

1267 **Bacon, Opus Majus Use math**

Bacon complied and finished *his Opus Majus*, recommending natural philosophies, i.e., sciences, be taught at Paris, then the principal Christian university. He was released from "surveillance."

He said, "If in other natural philosophies we should arrive at certainty without doubt, we should place the foundations of knowledge in mathematics as it was is the door and the key to the sciences."

Bacon's Opus majus urged using *Induction*. Said there were four "stumbling blocks to reaching the truth." 1. Weak and unworthy authority, 2. feeling of the uninstructed crowd, 3. Custom, and 4. Hiding of one's ignorance in a display of apparent knowledge.

The sixth part of *Opus Majus* outlined the different values and utility of experiments.

Bacon distinguished three different roles of scientific experiments, each producing its own peculiar result, and each being useful for learning, in different ways.

Experiments validate or refute the theoretical conclusions of other sciences.

By dividing experimental science into three functions, he showed the difference between science and

technology. *Opus Majus*, like all Western books of the time, was in Latin and read by only a tiny number of scholars, almost all clergy. Copies were rare and expensive.

The vast majority of people, from peasant to king, were illiterate, ignorant of science.

Bacon's Optics

Based on **al-Haytham's** work on optics, **Bacon** criticized the current scholarship, discussed experiments with light shining through water droplets showing the colors of the rainbow. He saw the principles of telescopes and microscopes. He built a magnifying glass. Said, "We can shape transparent bodies and arrange them so that the rays will be bent in any way we desire, and under any angle we wish; we may see the object near or at a distance."

"Thus from an incredible distance we might read the smallest letters. So also we might cause the Sun, Moon and stars in appearance to descend here below." (His optical predictions were not fulfilled for three centuries. The microscope was not made until 1590, the telescope in 1608.)

Bacon thus revived **Pythagoras's** fifth century BC insight that things in the world could be understood in mathematical terms. (**Galileo** and **Descartes** adopted this same emphasis on math 400 years later.) He said the speed of light is finite. (As did **Avicenna**, **Biruni**, and **al-Haytham**)

Books were rare and costly

Bacon's studies: He credited **al-Haytham's** advance of the *scientific method*. He said that the Earth was a sphere. He devised formulas for extracting phosphorus, manganese, and bismuth.

Clement 4 died in 1268 and **Bacon** returned to Oxford, starting to write *General Principles of Natural Philosophy*. He wrote several books.

How we think

1268 **Bacon** said that there were two ways of acquiring knowledge, reasoning and experience.

[rationalism and empiricism]" He said natural philosophy led to knowing about things as well as knowing God; both types of knowledge forming a unity under the guidance of dogma.

Thus, study all disciplines, observe the natural world. **Albertus, Grosseteste, and Roger Bacon** had practically initiated the experimental method in science (more **Bacon** 1271)

Thomas Aquinas

1269 **Theology: Thomas Aquinas / Tommaso d'Aquino** (c1225-74), son of the Count of **Aquino**, was a student of **Albertus** (ref. 1217) for several years. He was first a Benedictine (studied at Monte Cassino), then became a Dominican under **Albertus** in Paris.

Albertus introduced him to **Aristotle**. **Aquinas** was active in Church governance during his whole (short) life. He was the leading philosopher of the Christian Church.

He argued that God is the source of both the light of natural reason and the light of faith. His doctrine of the resurrection was that the perfect human being was a full composite of soul and body, and that with the purification of the soul would come a reunion with and glorification of the body.

God gave one a brain. So use it.

He was influenced by **al-Ghazali** and **Avicenna (1000)**. **Aquinas** gave all his thoughts to bringing natural philosophy under theological methods and Church control.

Said, all knowledge proceeds from first principles, which were themselves based on faith. He said there were only three truths that could not be proven by reason, the creation of the universe, the Trinity, and **Jesus's** role in salvation, and so must be accepted on faith.

Reason is a gift of God

1269 **Aquinas** believed God could be proved by reason. He knew the intellectual power of reason. He wanted to base religion on more than faith. "Reason in people is like God in the world." He based his theology more on this world than on a faith in the next. Said, "Reason is a gift of God." To his credit, he said a loving God had placed humans here on Earth full of intellectual puzzles, equipped with a thinking brain to deal with these puzzles. Had God really meant for humans not to think?

Aquinas

Aquinas rejected **Anselm's** 1076 *Ontological Argument* as an illogical jump from idea to reality. He said that not everyone who hears the word "God" understands it to mean something of which nothing greater can be thought and doesn't necessarily understand what the word signifies actually, only that it exists mentally. **Anselm's** ontological argument was largely forgotten until **Descartes**, **Spinoza**, and **Leibniz** centuries later revived variations of it. **Kant** killed it completely. (see 1781.)

Unbelief is the worst sin

Faith lets one surrender to God's authority. Faith is the greatest virtue.

Aquinas wanted to unite **Augustine's** two cities of God and Man. He said greed is a sin against God. Humans are at the juncture between the two cities, Humans have a body and a soul. There is unity in truth. Reason can prove some things, like the existence of God, but not other things, like the Trinity.

Faith is God's gift that lets Man's intellect surrender to the authority of God by believing in the unknown and the unseen. Faith is more than belief, which is filled with doubt.

Fearless certainty lets men know they possess absolute truth. Faith is the greatest virtue, and unbelief is the most serious sin. He was the greatest proponent of papal supremacy

against kings. He revived the theological spirit of the 13th century. He reconciled the *Bible's* creation contradictions. He said, God created the substance of things in a moment but the work of separating, shaping and adorning took six days.

1270 In Paris, Bishop **Tempier** condemned 13 propositions of **Aristotle** and **Averroes** as heretical and excommunicated anyone who supported them. (In 1277, **Tempier** condemned 219 more propositions.)

1271 **Marco Polo** China and the **Polos**: In 1269, **Kubla Khan** (ref 1258) in Peking had sent **Niccolo Polo**, a Venetian merchant who had gone to China as a merchant, back to Europe to ask the pope for 100 teachers to educate his Mongols; but there was no pope. In 1271, **Niccolo**, his brother, **Maffeo**, and **Maffeo's** son, **Marco** (1254-1324) set out by caravan for China. The new pope **Gregory 10** sent two Dominicans with the **Polos** to go to **Kubla Khan** as teachers. The Dominicans soon turned back

How caravans operate The trip took three years, going from caravan to caravan. (A caravan goes back and forth in a territory familiar to a caravan master with pack animals; camels for deserts, horses or donkeys in mountains. Merchants hire the master and his animals) They walked along trails named in 1870 as the Silk Road (*Seidenstrasse*). It was not a "road." It was merely trails known to the caravan masters in their area.

Banditry was common, so caravans stopped each night in caravanserais (fortified inns outside towns every 30-40 kilometers), so they would not have to overnight in open territory. Caravanserais were important economically as goods were bought, sold, and traded there. Cultures intermixed. Only expensive goods like silk and spices could economically be carried on the long Silk Road. (More 1299)

c.1273 **Aquinas was told to prove the Christian God existed** Christian theology: The Church directed **Thomas Aquinas** (ref 1269) to "prove" the tenets of Christianity with Aristotelian logic. His effort to do so was *Summa Theologica*. It was the second great synthesis of Christian thinking, after **Augustine**. *Summa* was unfinished when he died at 47. He worked out a new philosophical and theological system which attempted to reconcile **Aristotle's** reason with revelation (dogma). He said there were two sources of knowledge, human reason and the mysteries of the Church. Humans need more than philosophy in his search for truth; that certain truths are beyond human reason and are available only through divine revelation.

He said that theology was the most certain of all sciences because its source is divine knowledge. The contemplative life that calls others to the contemplative life is the best life. After hundreds of years in which the Church had denied reason out of hand, he invoked **Aristotle's** rational thinking and brought reason into theology and into Western thought and made it respectable for reason and faith to co-exist.

1273 **Summa** *Summa Theologica* is one of the classics of the history of philosophy and a most influential work of Western literature. It was a compendium of all of the main theological teachings of Christianity. It presented reasons for almost all points of Christian theology. Its two most important points are:
1. When people know an effect & know that it has a cause, the natural desire is to understand its essence.

Summa 2. Existence and essence are not the same. A thing has essence when it is imagined. Existence just means something exists. Existence and essence are separate in all things—except for God. God's existence, his simplicity, his eternal nature, is outside of time, outside of His created universe. God's knowledge and his power that created the universe can all be proved by human reason alone. Reason alone can not determine when universe began or was eternal. Only divine revelation tells that. Said all statements about God were either analogies or metaphors. *Summa* said God alone is the being whose nature is such by reference to him one can account for the fact of motion, efficient cause, necessity, perfection, and order.

Slavery OK **Aquinas** defended slavery as instituted by God to punish sinners and for war prisoners. He justified slavery as part of the "right of nations" and natural law. Children of slaves were rightfully slaves. Also, charging interest on loans was forbidden. Selling a thing for more than it is worth was unlawful. He said that masturbation was a greater sin than rape or torture as masturbation was non-procreative, thus a sin against God while rape or torture were only sins against people.

1273 **Summa** He said Jews delivered Christ to die and gentiles killed him. After the end of the world, it will be composed of non-living matter like rocks, but enhanced in beauty by the fires of the apocalypse. A new heaven and Earth will be established. Said that the physicist proves the Earth to be round by physics, by gravity; the astronomer by mathematics by the shapes of eclipses, or something of the sort.

God gives Male superiority: **Aquinas** adopted **Aristotle's** and the *Bible's* attitude regarding women. "In

women to men to have children. marriage, man receives by divine institution the facility to use his wife for the begetting of children." "A man is useful in the education of children as men are more rational than women."

Women are defective Women are defective and misbegotten, for the active force in the male seed tends to the production of a perfect likeness in the masculine sex, while the production of women comes from a defect in the active force or from some material indisposition." Said, male authority benefitted natural law and philosophy.

2 objections to God's existence Summa described two objections to God's existence and then answered them, The first was *the Problem of Evil*. The second was nature. Specifically, "Objection 1: "Whether God exists? It seems that God does not exist; . . . the word "God" means that He is infinite goodness. If,

1. Problem of Evil therefore, God existed, there would be no evil [suffering] discoverable; but there is evil in the world. Therefore God does not exist." (This is an honest iteration of the *Problem*.)

2. Nature Objection 2: "It seems that everything we see in the world can be accounted for by other principles, supposing God did not exist. For all natural things can be reduced to one principle which is nature; and all voluntary things can be reduced to one principle which is human reason, or will. Therefore there is no need to suppose God's existence."

He justified evil as God brings good out of evil. Aquinas's reply to Objection 1, God is the highest good, and He would not allow any evil to exist unless His omnipotence and goodness were such as to bring good out of evil. Evil is part of the infinite goodness of God. He allows evil to exist and out of it produces good."

He defined the concept of a natural evil, flood, drought etc. Like Christian theologians before him, **Aquinas'** reply here *assumes*, not *proves* a God. He seems to be saying that if there were more suffering, than God would bring more goodness out of it. The obvious question arises. Why permit evil, i.e., suffering to exist in the first place. Is there some benefit to suffering?

He said that there were three kinds of evil, metaphysical, moral, and natural.

1. Metaphysical evil is essentially privation in the law of individual natures.

2. Moral evil is a sin; it is based on inadequate knowledge. God is not responsible for it. Does this mean that an omnipotent God is powerless to prevent the suffering caused by moral evil acts?

3. Natural evil is determined by laws which also define the best consequences.

Evil must be judged teleologically in terms of the best possible whole.

Evil doesn't exist. He said evil is merely the privation of good (**Origen** and **Augustine's** argument), and, on God's omnipotence: God could not create things that could not logically exist (square circle, flat cube), as their descriptions themselves imply a contradiction. *Summa* said, "Whatever implies a contradiction does not come within the scope of divine omnipotence." (*Summa* 1.25.3). This simply shows the uselessness of bringing "evil" into a discussion when it is irrelevant. "Suffering" is relevant. "Evil" is not. Whether "evil" does it or doesn't makes no difference to one's suffering.

Summa

As suffering clearly exists, it means either omnipotence, or benevolence, or omniscience, do not exist and all three have to exist for there to be a Biblical or Koranic God.

He said further that God could not eliminate all evil as living things inevitably suffer from natural evils. In other words, God (creator of the universe) can't prevent earthquakes or floods.

He said, "If all evil were prevented, much good would be absent from the universe, there would be no patience of martyrs if there were no tyrannical persecution." (*Summa* 1.22.2).

I think that martyrs would prefer no tyrannical persecution in the first place to be patient about.

For **Aquinas**, God's powers appear to be dependent on evil existing.

"Act of God" 1273 "Aquinas's reply to Objection 2: As nature works for a determinate end (purpose, **Aristotle's** idea) under the direction of a higher agent, whatever is done by nature must needs be traced back to God as to its first cause. So also whatever is done voluntarily must be traced back to some higher cause other than human reason or will." This is contrary to modern scientific knowledge.

Five Proofs for God: The Church told **Aquinas** to devise proofs for God. Apart from **Aquinas's** arguments that *assume* a God, **Aquinas** said one could know that God existed through reason, so he devised five "*natural theology*" arguments that say there circumstances in the natural world that *infer* a God exists.

Proof from motion. A first cause argument. Aquinas's first proof is the *Argument from motion* . . . "Whatever is in motion must be put in motion by another . . . then this also must needs be put in motion by another, and that by another again . . . But this cannot trace back to infinity, . . . Therefore it is necessary to arrive at a first mover, put in motion by no other; and this everyone understands to be God."

Proof from Efficient cause	<u>The second proof: <i>Argument from first cause</i>.</u> There is no case known (or indeed, possible) in which a thing is found to be the efficient cause of itself. It is not possible to go on back to infinity to find efficient causes. Thus one must say there was a first cause, to which everyone gives the name of God.
Proof from necessary vs. possible being	<u>The third proof: <i>The Argument from Contingency</i>.</u> There are in nature things that are possible to be and not to be. As it is possible for such things not to exist, there must have been some time at which these things did not in fact exist, when nothing existed. If so, there would have existed nothing that could bring anything into existence. Another “first cause” argument. 1273 Contingent beings, therefore, are insufficient to account for the existence of contingent beings: “ <u>there must exist a necessary being</u> whose non-existence is an impossibility, and from which the existence of all contingent beings was ultimately derived . . . Therefore we must postulate the existence of some being having of itself its own necessity. This all men speak of as God.”
Proof from Goodness	<u>Aquinas’s fourth proof:</u> Among beings there are some more and some less good, true, noble and the like. But “more” and “less” are predicated of different things, according as they resemble in their different ways something which is the maximum . . . Therefore there must also be something which is to all beings the cause of their being, goodness, and every other perfection; and this we call God. In other words, Aquinas has given his definition of God.
Proof from the governance of the world, the Design Argument	<u>Aquinas’s fifth proof: a <i>Teleological / Design Argument</i>.</u> This argument was known to stoics and Aristotle , but Aquinas made it prominent. He wrote, “We see that things which lack intelligence, such as natural bodies, act for an end, and this is evident from their acting always, or nearly always, in the same way, so as to obtain the best result. Therefore some intelligent being exists by whom all natural things are directed to their end; and this being we call God.” This <i>Fifth Proof</i> argument said that demons cause natural evils (floods, etc), an ancient idea. Aquinas’s first four proofs are simply what are called “Arguments from Ignorance.” We don’t know how something happened, so God did it. A mystery to prove a mystery. Modern science has pretty well answered his mysteries. Aquinas could not use such arguments today. Aquinas’s fifth proof is the <i>Design Argument</i> that Hume destroyed with several independent arguments. See 1779- Hume
Summa	1273 <u>Epistemology:</u> Unlike Maimonides , Aquinas subordinated reason to the dogma of the Church. “ <u>There can be no falsehood anywhere in the literal sense of <i>Holy Scripture</i>.</u> ” “Revelation gives men mysteries, to be believed even though they cannot be understood . . . all that [sciences] had discovered about the world revealed the existence of the highest being, the Christian God.”
Four cardinal virtues	Aquinas adopted <u>Augustine’s Argument from Aesthetics / Beauty</u> . (Beauty, even the beauty of natural laws, exists, so God must have done it, a variant of the <i>Design Argument</i> .) He defined the four cardinal virtues, binding on everyone, as prudence, temperance, justice, and fortitude.
Theological virtues	And, <u>the three theological virtues are faith, hope, and charity</u> . God’s eight principal attributes are simplicity, actuality, perfection, goodness, infinitude, immutability, unity, and immanence. For him, greed was a sin against God. He said that the universe had not always existed.
There’s nothing false in Scripture.	Aquinas’s position was between Plato’s Nominalism (ref. 1121) and <i>Realism</i> (every existing thing requires two elements, its form and its matter, the form of a person is his <i>humanness</i> , a universal; the matter of a person is one’s individuality). Everyone has a station in life. Also, <u>there can be no falsehood anywhere in the literal sense of the Holy Scripture</u> . He defended the <i>Holy Inquisition</i> . He incorrectly thought that planets affect men’s actions (astrology) but using reason, one could overcome such forces.
Faith “perfects” wisdom	He said that reason can only take one so far and then faith “perfects” reason. <i>Summa</i> was organized according to the dialectic method of the scholastics. He posed a question, cited sources that offered an opposing view, resolved them, and arrived at his conclusion. Aquinas fused Christianity with Greek and Arabic natural philosophy, <i>scholasticism</i> , whose basic idea is that there can be no contradiction between the truths which God has revealed, and the findings of the human mind in natural philosophy. Scholastic scholars sought to prove this. The study of natural philosophy withered. So the scientific & metaphysical system of Aristotle merged into Christian dogma with all of Aristotle’s errors (335 BC). But dogma, as the word of God, cannot be revised where scientific ideas change with new knowledge. He argued that <u><i>naturalism</i> must be false</u> as it cannot explain mental phenomena like one’s understanding general concepts or infinite things.

This type of argument came to be called a “*God of the Gaps Argument*.” [gaps in our knowledge].

1273 **Aquinas** said one could not believe the Trinity through natural reason. So one must take it on faith.

Summa

Summa posited that there were areas of truth related to Revelation (which was reserved for dogma) and truths in the natural world which reason could handle. In other words, he read the *Bible* like **Augustine**, interpret the nonsense to sound reasonable. He did say, Had God intended humans to pass through this Earth with blinders, only with his eyes on another existence in the future after he is dead?

Kill heretics and atheists.

Summa also said that heretics and atheists should be excommunicated and killed. (Remember **Jesus** said, My enemies who don't want that I should reign over them, bring here, and slay them before me.”

High-born lives are worth more than low-born.

Luke 19:27.) “The sin of unbelief [an opinion] is greater than any sin that occurs in the perversion of morals.” *Summa* argued that punishment depends on whom one harms. Hit an authority person, gain a greater punishment than hitting a low born person. Strike God, the infinite majesty, go to Hell, the greatest punishment. Killing heretics was not only appropriate but necessary to defend the salvation of the faithful. The concept of sin overpowered people's minds. **Aquinas**, “We cannot know what God is but what he is not.” *Summa* quoted **Aristotle** c.3,500 times and **Pseudo-Dionysius** c1700 times.

Kill Jews

Christian Justice: As Jews are, according to law, sentenced to perpetual slavery for their sins, the rulers of the lands where they are found may seize their property, [except what they need for life. Kings did so.

Chain of Being

Aquinas posited a hierarchal and interconnected seamless universe, the *Chain of Being* (Like **Plato** and **Origen**), with God at the top, then angels, Man, animals, plants, air, earth, fire, water.

Aquinas also laid out the criteria of **Augustine's** approval of a “just war.” Namely:

1. It must be waged by a proper authority, like the state (proper authority represents the common good)
2. It must have a good, just purpose, & 3. Peace must be the central motive even in the midst of violence.

A monarchy is the best government

Political Theory, monarchy: **Aquinas** said a monarchy was the best government. He advanced law by defining law as “an ordinance of reason for the common good, promulgated by him who has care of a community.” Greeks had thought law was rational and impersonal. **Aquinas's** law was a volitional act of Man. Government is to lead citizens to live virtuously. Contrary to **Aristotle's** ideal state being a city-state, he argued that a nation is preferable as it is more self sufficient & resourceful.

He answered **Socrates's Euthyphro Dilemma** (Why is something good?) as, “God commands something because it's good, and it's good as goodness is in God's character and expressed in moral commands.” He argued that naturalism cannot explain phenomena as the mind's ability to grasp general concepts of infinite things, to know things other than bodies, and to self reflect.

Faith
1273

Aquinas's attempt to reconcile dogma and reason was disputed from both sides. Strict believers said that reason intruded improperly into the mythical communion between God and Man. Those who saw no evidence for a God said that reason did not have to accede to any ruler of the *City of God*.

Most authoritative exposition of Christian dogma

Summa Theologica amassed an array of authoritative opinions and reasoned answers to questions of faith and morals. It soon became the most, using Aristotelian logic to expound Christian doctrine. All of Christian thought may be seen as variations on the essential positions of **Augustine**, a Platonist, and **Aquinas**, an Aristotelian.

Summa

Similarly, the history of philosophy may seen as be variations on the works of **Plato** and **Aristotle**. Most importantly, *Summa* moved the Medieval mind toward intellectual independence.

Finding arguments for a pre-determined conclusion is not philosophy.

Aquinas critiqued: **Bertrand Russell** criticized **Aquinas**. Said that **Aquinas** did not engage in an inquiry where the conclusion was unknown. Before he began to philosophize, his conclusion was known; it was simply Catholic faith. He looked for apparently rational arguments for some parts of the faith, so much the better; if he cannot, he need only fall back on revelation.

“The finding of arguments for a conclusion given in advance is not philosophy, just special pleading.” Most theology is exactly this, seeking arguments to support some religion's dogma.

1277 *Christian fear of learning, The Condemnation of 1277*: Students of **Averroes's** critiques of **Aristotle** at the U. of Paris led by **Siger de Brabant** began to say reason might be more valid than revelation, so **Brabant** was forced to retire.

Bishop Tempier prohibited learning

Bishop **Tempier** prohibited teaching of 219 philosophical and theological theses on pain of excommunication, including certain teachings of **Averroes**, **Aquinas**, and **Aristotle** (including his statement that God could not create a vacuum, or an infinite universe, or other universes).

Tempier said that God's absolute power transcended any principles of logic of **Aristotle** or **Averroes**. Some interpret **Tempier's** act as evidence that rational thinking was so alive in the 13th century that he felt he had to fight it. **Aquinas** soon was the Church's most eminent scholar.

Christianity: British historian, **GG Coulton** (1858-1947) says that in Medieval Europe free thought was driven underground, but not "altogether exorcised."

Imprisoned for "suspected" novelties 1277 Christian fear of ideas: **Roger Bacon's** (ref 1243, '52, '67-8, '71) Franciscan order imprisoned him for having "suspected novelties" in his teaching, mainly that he said that belief followed understanding. He was only freed in 1290 shortly before he died when a new friar took over.
So the Church imprisoned or surveilled the greatest scientist of his time for almost half his adult life just for "suspected" ideas. He was more significant to persons than any king of his time.

c.1290 God can do anything Christianity: **John Duns Scotus** (1265-1308) born in Duns, Scotland, a popular Franciscan, professor at Oxford, disputed **Aquinas's** fusing dogma and Aristotelian philosophy / logic.
Scotus made things safer for the scientist *and* the theologian by separating experiment and scientific reasoning from dogma. (**Ockham** soon did the same, see 1331).

Aquinas had said God's powers were limited by what was logical, **Scotus** said that God is not limited in any way whatsoever, least of all by the human mind. God is absolutely free and absolute freedom means being free of reason, as well as all else.

He was a strong defender of the notion that everyone had libertarian *free will*.

Edward 1 expelled Jews from England, stole their property, citing usury. Many Jews "converted" & stayed.

Marco described China 1298 China: The **Polos** (ref 1271) stayed in Peking 20 years, getting rich trading. **Marco** went on diplomatic missions in Asia for **Kubla**. The **Polos'** 1292 boat trip back to wealthy Venice took two years (They needed to wait for favorable winds and currents).
In 1298, as a war prisoner in Genoa, **Polo** recited his adventures in China to **Rusticello da Pisa** who wrote them up. It was widely copied and translated. China's grandeur was described.

Polo's descriptions of China, Burma, Siam (Thailand), Java, and Sumatra was virtually the only Western knowledge of Asia for centuries. **Polo** noted that the great Chinese junks had bulkheads and a center rudder, better than the steer boards used in the Med. Western ships only used center rudders hundreds of years later..

Marco opened Europe's eyes to Asia **Polo's** descriptions encouraged merchants to want to trade with China. The Portugese sought a water route to China. China kept its lead in grandeur over Europe until the 16th century and the spread of printed books in Europe. **Polo** said that as the Earth was a sphere, so China could be reached by sailing west from Europe. (The Americas were unknown to **Polo** and Europeans.)

Europe was still c.98% illiterate, including the feudal lords. Earth was universally thought to be the center of the universe. Planets were thought to influence personal and worldly affairs, astrology.

Humanism, the spirit of inquiry, and the notion that humans are the center of concern developed.

European daily life: The fastest transportation was on foot or on horses. Roads were wagon trails. Wagons on the main "road" from Frankfurt to Berlin were limited in width to the space between two houses in Gelnhausen, a village east of Frankfurt. Few traveled, then only in groups. Communication was slow. It took a month for news of the Muslim capture of Constantinople in 1453 to reach Venice. Craft guilds were organized to protect their craft's monopolies.

Europe emerging from the Dark Ages While Europe emerged from its *Dark Ages*, the larger "gunpowder empires," China, Hindustan, and the Ottoman Empire, were at their peak. Constantinople was the largest and most sophisticated Western city. Mechanical clocks, using weights or springs, began to replace water driven clocks, let persons standardize the day and fostered belief in a world where quantitative measurement and mathematical certainty could be applied to nature. Mechanical engineering and city-states flourished, and evolved into nation states. The world began to be known.

1300-1500 Renaissance: Khaldun Erasmus Humanism daVinci Columbus

The Renaissance	Overview: 1300 was the <u>arbitrary end of the Middle Ages</u> and the beginning of <i>The Renaissance</i> (Rebirth) of <u>classical humanities</u> , which began in Muslim Spain but usually credited to Florence
Arbitrary end of the Middle Ages	where the forces of nationalism and royalty began to assert themselves at the expense of the pope. 1300 is an approximation as important changes in scholarship had occurred in the 1200s. Popes had made Hadrian's Tomb into a fortress to be safe from Rome's starving Romans. In politics, <u>rivalry between the pope and the HR emperor: Who had more power?</u> It fluctuated depending on the character of the particular emperor or pope.
Anti-Semitism	During the <i>Renaissance</i> there were also <u>dozens of instances of Church persecution of Jews</u> , like exiling them from cities, dioceses and entire countries; destroying synagogues; denying them the right to own land or to hold office.
Renaissance looked back to classical Athens and Rome.	By 1300, most Arabic (and thus Greek) science and philosophy had developed in Cordoba and Toledo, Spain. As the route to France was through the Pyrenees, the towns of Southern France grew. Montpellier became the chief center of astronomical and medical studies in France. <u>The Renaissance</u> looked back to Greek and Roman rational thinking and knowledge, art, literature, and architecture. It showed scholars the variety of opinions among Greeks. Peter the Venerable translated the <i>Qur'an</i> into Latin
	<u>The Renaissance spread slowly</u> from Florence, <u>reaching North Europe only two centuries later</u> . The idea of self-governing city-states spread. Three-field crop rotation (wheat/rye, oats/legumes, fallow) and the horseshoe in N. Europe increased crop output, spurred growth of cities. Venice signed a trade treaty with Egypt. Modern diplomacy and "modern" societies were born in the city-states of northern Italy. Nobles engaged in diplomatic missions. The first permanent embassy was established by Milan in Genoa. Town clocks were at first bell towers. (German glocke = bell.)
1300 It's the Money	<u>Jubilee, Selling Heaven:</u> Pope Boniface 8 (1235-1303), a ruthless political pope, instituted the year of <i>The Jubilee</i> , where absolute indulgence was granted to all Christians who visited Rome, did certain ceremonies, <u>and donated money</u> . Originally planned as an event for each century, it was so profitable, it was changed to every 25 years. It's the money.
Boniface massacred 6,000	Boniface destroyed his political rivals, the Colonnas , by killing all 6,000 residents of their home town, Palestrina, east of Rome. Boniface's bull, <i>Unam sanctam</i> , (1302), <u>decreed that the sovereignty of the pope over every human was absolutely necessary for salvation, the most extreme claim ever made by a pope</u> . He used two years of papal revenue to buy land and cities that he then gave to his family. He named several relatives as cardinals. He ordered French King Philip 4 (1268-1314) not to tax Church property.
Dante put him in the lowest level of Hell	Another rival family was the Orsini family, a Roman noble family that included three popes, 34 cardinals, and other important political and religious figures. So Philip 4 and the Orsini family imprisoned Boniface , who soon died. In 1303 Dante's Divine Comedy put Boniface in the circles of fraud, destined for the lowest circles of Hell (<i>Inferno</i>).
	<u>Universities founded/chartered:</u> Lleida 1300. Sapienza (Rome) 1303. Perugia 1308. Treviso 1318. Florence/Firenza 1321. Timbuktu-Sankore 1327. Camerino 1336. Grenoble 1339. Pisa 1343. Prague 1348. Milan/Milano 1361. Krakow 1364. Orange 1365. Vienna/Wein 1365. Pavia 1381. Heidelberg 1386. Cologne/Koln 1388. Ferrara 1391. <u>Universities created a class of thinkers</u> , They collected Spanish Muslims' translations of Greek texts into Arabic, then into Latin, helping spread the <i>Renaissance</i> . Graduates could teach anywhere.
Italian business	<u>Education:</u> In Italy, three kinds of schools developed, those run by cities, private schools, and <u>abbaco schools</u> , essentially business schools for boys (only). Boys 13-15 were taught, arithmetic, accounting, weights and measures, multiplication table, bookkeeping, loans and interest, .

schools

Reading made easier In writing, Texts, still hand copied, became more reader friendly, with word separation, punctuation, stabilization of word order (subject-verb-object), table of contents, alphabetization, chapter headings, running headlines, began to be used. So more books were produced.

1305 **Philip 4** pressured the cardinals in Rome to elect his bishop of Bordeaux as Pope **Clement 5**. **Clement** set up his court in Avignon, France, part of the Papal properties. **Clement** never went to Rome. He made four of his sons cardinals. Popes lived in Avignon until 1377, known as the *Avignon Captivity*.

Corruption by popes caused a loss of influence The popes's blatant corruption caused rulers of the new nation states of Europe to disdain the pope's authority seeing him (correctly) as merely a tool of the French king. It also sparked the counciliar movement to limit the pope's power. That is, bishops in councils wanted to set church policies, rather than the pope. The masses of peasants lived as always, terrified of Hell.

Warfare caused economic growth Ironically, the chronic warfare and extreme disunity in Western Europe contributed to its rapid cultural and economic growth, as unending competition among rival polities and philosophies kept society fluid and encouraged innovation.

Italy with its Mediterranean ports was best suited to dominate trade with the East, trading, importing goods from the Orient for sale in Europe, developed managerial and banking systems.

1305 Fear of thinking: Rabbis prohibited Jews under 25 to read **Maimonides's** *Guide for the Perplexed*.

1306 **Anti-Semitism** Christian anti-Semitism: King Philip 4 expelled Jews from France and stole their property. Jews, prohibited from owning land, gravitated to finance. The massacre /expulsion of Jews became a regular feature of *Medieval* European life. **Philip 4** and Pope **Clement 5** (now in Avignon) also trumped up false charges against the Knights Templar and stole their property.

1307 **The secret of raindrops** Natural philosophy: Theodoric of Freiberg, a Dominican, following Aristotle and al-Haytham, performed the first known scientific experiment in Western Europe. He figured out what caused a rainbow, different angles of reflection and refraction of sunlight on raindrops. (Persian astronomer **Qutb al-Din al-Shirazi** may have explained it some years earlier.) The spreading of ideas among scholars was inefficient, face to face or hand-copied documents,

1308-20 **Dante's Divine Comedy: Hell was interesting. Heaven was boring** Literature, Divina Commedia: Dante Alighieri (1265-1321), a jurist, statesman, and poet, in 1296 had been banished for life from Florence and condemned to death for backing the wrong politician. He wrote *Divina Commedia /The Divine Comedy* (in Tuscan/Italian, not Latin), a masterpiece, a journey through the afterlife, three places, *Inferno*, *Purgatorio*, and *Paradiso*. In Hell/*Inferno*, he found corrupt clergy and sinners, interesting place, Purgatory and Heaven (boring), where **Dante** met all the great competing theologians who lived together there in peace and harmony. The trip was an allegory for the human soul to God. and the progress of the political and social mankind toward peace on Earth.

Lord **Bryce** called *Divina Commedia* the epitaph of the Holy Roman Empire

Problem of Suffering? **Dante** wrote, "The hottest places in Hell are reserved for those who, in a time of great moral crisis, stay neutral" (Some saw this as a criticism of God for not preventing suffering in the world.) **Dante** said, "[God's] will is our peace." So, are we free? Is there any aspect of us where God does not intrude?"

Middle Ages faded. **Dante's** answer, We achieve a higher freedom by devoting ourselves to God. Thus the Middle Ages ended in splendor and abject failure, unrealistic. He argued for a world state governed by an emperor. Divine Comedy was anti-clerical but very Christian.

Dante's *De Monarchia* c.1317 advocated a world monarch to assure peace, necessary for human happiness. (It was put on the *Index of Prohibited Writings* when Pope **Paul 4** instituted the *Index* in 1559.)

1310 **Clement 5** in Avignon told English King **Edward 2** to torture *Knights Templar* who wouldn't confess.

1317 Dogma: Christian fear of witchcraft was so severe that Pope **John 22**, in Avignon, issued *Spondent pariter* aimed at alchemists, but which crippled the rudimentary science of chemistry. In 1320, he authorized the *Holy Inquisition* to prosecute sorcery and urged princes to fight it. Chemistry was known

as one of the Seven Devilish Arts. (In 1323, he declared the Franciscan Spirituals heretical. Ref 1210)

It's the Money

The Church was big business: **John 22**, the "Banker of Avignon," created a financial system that made the papacy far richer, principally by selling offices. Bishops sold indulgences. **John** destroyed friars who reminded him that **Jesus** and the disciples were poor. **Petrarch** called Avignon *Babylon*.

1324
Marsiglio da Padova

Political Theory, democracy: **Marsilius of Padua / Marsiglio da Padova** (c.1275-c.1343) wrote *Defensor Pacis*, called "the greatest and most original political treatise of the Middle Ages."

Democracy

Marsiglio held that the legislator represents the majority of the people. And the people had the right to punish princes. He wanted the HRE to be independent of the pope and the privileges usurped by the pope. This was heresy. He advocated popular sovereignty in the Church as well.

He energized the new form of opposition to the pope. He urged that local councils, including the laity who elect representatives to the General Council could, *inter alia*, excommunicate the pope and interpret *Scripture*.

He wanted to preserve the unity of the Church, but democratically, not by papal absolutism.

Aristotle: Government is to help people live a cultured life.

Aristotle had said that the purpose of government is to enable persons to live a cultured life,

Marsiglio said a state was necessary, with a hierarchy within that state, and a sovereign to adjudicate conflicts, make and enforce law. He wrote that popular sovereignty / democracy is desirable as pooling political wisdom brings better laws and can better perceive flaws in laws, so fewer will be harmed by laws. Such laws are more apt to represent the common good and more likely to be obeyed. The executive should spring from the common will. So, elect a king.

Pope: No democracy

For these democratic ideas, he was excommunicated. (For a believer, this was a ticket to Hell.) His ideas encouraged nobles to seek to share power with kings & bishops to share power with popes

1331

Ockham:

Philosophy, **William of Ockham / Occam** (c.1290-c.1350), Brit, a Franciscan friar, separated faith from knowledge, philosophy from theology, and logic from metaphysics. So he made faith safe from reason. A new intellectual spirit was developing. Scholars studying **Aristotle** found errors.

Faith and reason have nothing in common

Ockham was one of the principal causes of the dissolution of **Aquinas's** synthesis of natural philosophy and theology.

Like **Duns Scotus**, **Ockham** said that faith and reason have nothing in common. Reason can know nothing of faith. God is outside the realm of reason and the sole source of moral values. He rejected **Aquinas's** impressive system of natural philosophy based primarily on the notion of causality. **Ockham** developed a strictly, and in a sense, skeptical view regarding knowledge.

What we know depends on God's will.

Ockham: God can affect our intuitive cognition. Thus what we know depends on God's will. "To say that some things are caused by other things gives no warrant to argue that God causes the natural order." He concluded that we can know nothing about God but only that unaided reason cannot discover God. All knowledge derived from experience, made possible by reflection on experience, depends on a prior intuitive sense experience of things.

1331

No other Christian thinker of the Middle Ages rejected so many or so important then current assumptions as did **Ockham**. He rejected **Aristotle's** and **Aquinas's** concept of a "prime mover" who keeps things going. He reintroduced the concept of *impetus*, a precursor to *inertia*.

He said God was the originator of impetus. God's will is not fathomable as it cannot be understood through human reason, but rather through faith and dogma.

He criticized the extravagance of the Vatican. He wouldn't retract his "heretical" statements. So he was excommunicated and imprisoned as a heretic. He escaped to the protection of German princes.

Being excommunicated did not disturb him. He disdained the papacy and the Vatican. Despite this, he was a believer, said there were no objective moral values apart from God's commands.

Ockham's Razor.

His "razor" was, "Entities should not be multiplied unnecessarily," i.e., cut away universals one couldn't scientifically prove. Nature consists only of things. He denied **Aquinas's** and **Plato's** idea of *realism* (i.e., *universal ideas* like red, small, and good are real). He said that such "universals" don't exist.

Cut away the non-essential

Like **Abelard**, **Albertus**, **Aquinas**, **Averroes**, and **Duns Scotus**, **Ockham** distinguished between theological truths and philosophical reason-based truths. "The Truths of God (dealing with salvation) were infinitely more important than truths of nature (which deal with mere

bodily comfort.).” Ockham’s theology thus for 300 years built a wall to protect Christian dogma from reason. Such separation allowed reason, freed from the Church, to flourish.

Monarchy bound by natural law is best

Political Theory, monarchy: **Ockham** favored a monarchy bound by natural law (respect for private property). Democracy was not considered. The state should promote virtue, dispense justice, make laws, and most importantly, punish law breakers. He rejected the pope’s power in secular matters; said that religious orders should own no property or wealth. So, in 1339, the Church put his works under a ban and condemned them. The pope and his Curia were then living in Avignon.

c.1339
Humanism
Petrarch, first great humanist

Philosophy, Humanism, concentrating values on humans rather than on the divine: *Humanism* was more concerned with re-establishing the secular values of the Greeks & Romans than reviving **Aristotle’s** science. **Francesco Petrarca / Petrarch** (1304-74), the first great humanist, loved the joy of living. He was the first to say that the Dark Ages caused a decline in the body of human knowledge from the grandeur of Rome. At 35, he was one of Europe’s most famous scholars, poet laureate of Rome. He is often thought of as the father of the *Italian Renaissance*. He searched monasteries for forgotten Latin manuscripts. He and **Boccaccio** helped rediscover Greek and Roman humanism.

Petrarch wrote of the joys and sorrows of real people. He emphasized the use of pure classical Latin, so scholars could use **Cicero** as a model for prose and **Virgil** for poetry. (more **Petrarch** at 1345, ‘52, ‘95). *Humanists* were of course skeptical of supernaturalism. *Humanists* believed that knowledge came from human observation and analysis rather than from supernatural powers and that the “liberal studies,” history, moral philosophy, rhetoric, letters (grammar and logic), poetry, math, astronomy, and music, were the key to true freedom. Artists became famous and wealthy.

1345
Cicero’s letters were found

Petrarch (ref.1339) found a volume of lost letters of **Cicero** he had sought for years. They were personal, conversational, unlike formal Medieval writing. One historian calls this event the start of the Renaissance. All written materials were hand copied and rare. Lesser monks and brothers spent their lives copying manuscripts. (more **Petrarch** 1352, ‘95).

1347-51
Black Death

Bubonic plague, Black Death, from bacteria in fleas on rats, migrated from ships from Asia to Crimea to Messina, then to all of Sicily, to the Italian mainland and to all of Europe, killed 1/3 to half of Europeans and the Near East and more in the rest of the world. (Estimates vary greatly).

Farms reverted to forests. Trade fell. Scarce labor went up in value

People moved to the cities. Farm land reverted to forests. Trade fell drastically, but it had large consequences. Survivors inherited land, money, houses, clothes. More private chapels were built, charities founded and mysticism arose. Labor, being scarce, went up in value, landlords had to treat peasants better. It prompted investments in technological innovation in industry, textiles, mining, and banking. In addition, huge amounts of excess clothes were made into paper, which, in the 1400s, helped spread printing.

Blame the Jews, again

Anti-Semitism: As usual, Jews were blamed for the the plague, causing mobs in many cities to attack Jewish neighborhoods and massacre the inhabitants. The theory was also as usual nonsense as Jews were affected same as everybody. This plague was the modern world’s most devastating natural disaster. Over the next 300 years, smaller plagues broke out in many areas.

By this time, many German states / principalities / duchies / bishoprics had expelled Jews and stolen their property. Venice, an island, made arriving boats anchor offshore for 40 days before landing. (Hence *quarantine*). Ships in the Med began to use stern (not side) rudders, as the Chinese had done for centuries.

1352
The Decameron

Literature, Philosophy: **Giovanni Boccaccio** (1313-75), wrote *The Decameron*, in Italian, showing the sensual nature of Man. With his friend **Petrarch**, he attempted to revive classical, i.e., Greek, culture. The *humanism* stimulated by classical learning affected every aspect of cultural life, broadening it beyond the confines of the religious symbolism central to the *Medieval* mind. Spectacles came into use.

1374-80

Pure Christianity: **Geert de Groote** (1340-84), a lay man, walked around Holland, like **Wycliffe**, preaching a simpler form of Christianity than most clergy at the time. He attracted many scholars. The *Brethren of the Common Life* was based on his preachings. After he died the pope accepted him.

1377
Piers Christianity: **William Langland**, Brit, published *William’s Vision of Piers Plowman*, an allegory that contrasted the suffering honest poor with the corrupt high clergy.

Plowman Said, "There are none harder nor hungrier than men of Holy Church."

1377 **Great Western Schism**: While the popes resided in Avignon (1305-1377, the *Avignon-Captivity*), they had appointed 134 new cardinals, 113 of whom were French.

**End of
Avignon
Captivity**

In Avignon, the popes (all French) and his cardinals lived in obscene splendor from their ownership of lands and from wealthy cardinals who shared their revenues with the popes.

This of course discredited the papacy among true admirers of **Jesus**, and gave rise to critics like **Geert de Groote** (ref.1374) and **Jan Hus** (1398). Some called for the pope to return to Rome. So, in 1377, Pope **Gregory 11** returned to Rome, ending the *Avignon Captivity*. He died in a year.

**It's the
money**

Romans pressured the cardinals to elect an Italian as pope. The cardinals now in Rome elected Italian **Urban 6**. **Urban** appointed many Italian cardinals and established his *Curia* there. His first address to the cardinals attacked them for their lust for power, their scandalous wealth from simony, their neglect of their duties, and their immorality. He accurately called one a fool, one a liar, one a bandit. So the insulted French cardinals, still a majority of cardinals, elected French **Robert of Geneva** as **Clement 7**, who set up his papacy back in Avignon. He is now considered an anti-pope.

**Two
popes
Great
Western
Schism**

So, there were two popes, Urban 6 in Rome and Clement 7 in Avignon, now called the Great Western Schism. Nobles of Scotland, France, Spain and South Italy supported the **Clement 7** in Avignon. Nobles of England, Germany, Scandinavia, and Northern Italy supported **Urban 6** in Rome. **Urban 6** and **Clement 7** called each other the Antichrist and excommunicated and cursed each other's adherents. Each pope's policies needless to say favored his patrons' interests.

**Khaldun's
theory of
history**

History: Ibn Khaldun (1332-1406), a Tunisian and government official in several North African states and Spain, conceived and formulated a philosophy of history which according to Toynbee, was "undoubtedly the greatest work of its kind ever been created by any mind in any time or place."

1377 **Khaldun** wrote in a time when settled areas were smaller and surrounded by vast ungoverned areas populated by nomads. His *Muqaddimat / Introduction to History* explained the rise and fall of states as a constant renewal or replacement of the settled ruling group by nomads conquering the towns, in four generations losing the hardness of the desert and acquiring the vices and slackness of town life, and being replaced by hardier invaders from the desert.

**Khaldun
described
Africa's
primitive
persons**

Regarding Africa, he said, beyond the known peoples of black West Africa "to the south there is no civilization in the proper sense. There are only humans who are closer to dumb animals than to rational beings. They live in thickets and caves, and eat herbs and unprepared grain. They frequently eat each other. They cannot be considered human beings. Therefore, the Negro nations are, as a rule, submissive to slavery" (The severity of this translation has been blamed on 19th century racist French attitudes put in Khaldun's Arabic text.)

Although the demographics of the world have vastly changed, **Khaldun's** concept contains valid insights. He said the demise of science in Islam was because science only thrives in affluent societies.

1380-1405 **Mongol empire: Timur-I-lang/Tammer the Lame/Tammerlame (1336-1405)**, a brilliant Mongol general ruling from Samarkand founded the Timurid empire of Central Asia, brutally massacring 17 million Christians and Muslims. His empire stretched from Syria to Delhi, but it withered after he died.

**Peasant's
revolt.
"Why do
they keep
us in
bondage?"**

1381 **Wat Tyler's Rebellion, the Peasants' revolt**: The 1348 plague had caused great social and economic disruption. Needing money, King **Richard 2** imposed a poll tax on all Englishmen. Priest **John Ball** spoke for the peasants, "Good people, things cannot go right in England and never will until goods are held in common and there are no more peasants and gentlefolk.

We are all one and the same." "In what way are those we call lords greater masters than ourselves? How have they deserved it? Why do they hold us in bondage? If we all spring from a common father and mother, Adam and Eve, how can they claim or prove that they are lords more than us, except by forcing us produce and grow the wealth that they spend? Whan Adam dalft (delved) and Eve span, who was thanne a gentil man?"

The peasants revolted, burned manor homes, and advanced on London. King **Richard** promised them reforms. The peasants dispersed. **Richard** reneged on his promises and, with the nobles, arrested hundreds of rebels and killed **Tyler** and **Ball**. Other similar revolts similarly were beaten.

- c.1382 **Wycliffe: Church bureaucracy not needed to attain the state of grace.** Christianity: For centuries the Church had been deeply corrupt, selling Church offices, selling sacraments, practicing nepotism, engaging in debauchery, and occasional murder. **John Wycliffe** (1320-84), an English priest, who taught dogma and philosophy at Oxford was a forerunner of the Reformation. He translated the *Vulgate Bible* into English. Said, "This *Bible* is of the people, by the people, and for the people." He preached against the corruption in the Church, said that Christ is Man's only overlord, the *Scriptures* are supreme authority, & the Church bureaucracy was not needed to attain the state of grace. (**Martin Luther** said this 140 years later.) **Jesus had no property** Wycliffe taught that property was a result of sin, that as **Jesus** and the apostles had no property, nor should clergy. Said, there's no biblical support for a pope, cardinals, or riches. He said, "I believe that in the end truth will conquer." This insulted the ruling clergy, So the Church hierarchy expelled him from Oxford. He continued his preaching and in 1384, had a stroke and died.
- 1387-1400 **Everyday life:** **Geoffrey Chaucer's** epic *Canterbury Tales* described the petty corruption of clergy and common folk. The tales (mostly in verse) purport to be stories told by pilgrims on their way to Canterbury Cathedral. The tales range from chivalrous romances to bawdy, provide a colorful, satirical, and critical portrayal of 14th century English society. They helped popularize the English vernacular in mainstream literature. They are one of the most important works in English literature.
- Trade with the East** Trade with the East: After **Ptolemy**, maps had deteriorated into useless religious cosmography, showing nonsensical creatures. In the 1300s and 1400s, more accurate Greek and Roman maps of the Med began to reappear. Europe got pepper (to preserve meat) from the Spice Islands (Indonesia) over the Silk Road or by Chinese junks from Indonesia to Malaysia. Muslim merchants then sailed them to Calicut (Southern tip of Hindustan), then by dhows up the Red Sea, then by camel to Alexandria or Damascus. Italian merchants then sailed them to Europe. A trip could take a year. A better route to the East was needed.
Italian cities (mainly Venice and Genoa) monopolized trade with China through Muslim (and for a short period, Chinese) ships. Muslim ships couldn't make long sea trips.
Venice (not under Pope control) was the most important city on the Med. The best Western ships, Arabian dhows, were clumsy. They largely followed the coast. In the Indian Ocean, monsoon winds were generally north-easterly in winter and south-westerly in the summer.
The *Qur'an* discouraged Indian Ocean Arab traders from sailing west of Madagascar.
- c. 1397+ **Florence Bankers** **Wealth became the main basis for class distinction, not birth.** Cities became sovereign entities, speaking their local languages which diminished the use of Latin, the language of European scholars. Florence with its *abbaco* schools, emerged as a leader in commerce and the arts and became the richest city in Europe. The modern idea of the artist as a genius and bohemian, operating by his own rules, first began in Florence.
The **Medici** family, patrons of the arts, began lending money on an international scale, opening banks throughout Europe. Florentines had their gold florin, which was accepted everywhere and became the first international bankers. Wealth became the main basis for class distinction, not birth. The wealthy were also the *intelligentsia*.
Textiles was Florence's largest industry, but entrepreneurs of all kinds came and flourished.
- Secular Humanism ruled in Florence and North Europe** The temporal power of the Church was fading. Florence confiscated Church lands. Burghers and merchants and *humanism* ruled. *Humanism* largely dominated the next 100 years of Florentine and N. European educated persons. **Augustine's** ascetic in the cave was gone, replaced by persons of the world. Education was for public life (thus mainly for males), not Church life.
Aquinas's synthesis of faith and reason was unraveling. Humanists ridiculed Scholasticism as meretricious verbalism and futile triviality. Many simply began to ignore the Church.
Civic humanism: Historian **Kenneth Clark** says that the discovery of the individual was made in Florence. The Republic of Venice became a leader of diplomacy and international agreements due to its far-flung sea trade contacts with Muslims. Florence gave *humanism* a new direction, away from **Petrarch's** intellectual life of solitude to one of civic participation.
Cicero became the *Humanists'* model, as an intellectual Man of civic duty.
- 1400 **15th century** **Overview:** Modern concepts of God emerged between 1400 and 1800. Many small states / principalities / free cities / bishoprics, with varying degrees of independence peopled Europe. While Latin remained the language of scholars and clerics, literature from **Dante** (*Divine Comedy* 1310). Books were hand copied and expensive. Books were shorter than today. (45 copyists working for

Cosimo de Medici in two years produced 200 books, i.e., one book every six months per copyist.)

- c.1400 A Florentine brought **Ptolemy's** great second century text and map, *Geographia*, from Constantinople to Florence. It had grids, showing the West's known world from the Canaries and Iceland to Ceylon. Its expansive view of the world had been forgotten in the West for 1,000 years.

1405 **Christine de Pizan** (1364-1430), Venetian, widow with children, a humanist, criticized the prevailing male domination in all matters.

1405-33 **China dominated the Indian Ocean trade.** China: Western trade with China before 1405 was along various land trails known to caravan masters who owned camels for deserts or donkeys for mountains, and knew a certain area and with some Arab and Chinese ships in the Indian Ocean. Under the sponsorship of the new **Ming** (Enlightened) Dynasty, the Chinese general/ admiral / **Zheng He / Cheng Ho**, sailed from Suzhou with 60 ships (many far larger than Western ships, up to 400 feet (4-6 masts, 12+ sails and four decks) and 28,000 men, provisioned for two years).

Zheng He's "Treasure Fleet" He had troop ships, water tankers, supply ships, had a drop keel, carried horses. He had doctors, merchants, bankers, boat repairers, gifts of tea, silk, and porcelain. He dominated Indian Ocean trade. In seven trips, he sailed as far west as Hormuz (Persian Gulf) and to the East coast of Africa and to Malaysia. These journeys were remarkable for their vast scale and for their diplomatic and trade objectives. **Zheng He's** expeditions were instrumental in establishing China's presence in the Indian Ocean and fostering diplomatic ties with numerous Southeast Asian and African nations.

He brought back exotic animals (including ostriches, zebras, a giraffe) and ivory. In China, faster growing varieties of rice increased crop yields (and population). But in 1433, China retreated.

- c.1408 **Al-Kashi's** *Key to Arithmetic*, described using decimals to whole numbers and fractions. (See 1585) Church fear of learning: The *Third Synod of Oxford* prohibited **Wycliffe** versions of the *Bible*.

1409-1502 Universities founded, all Christian: Leipzig 1409. Aix 1409. St. Andrews 1411. Rostock 1419. Dole 1423. Leuven 1426. Caen 1431. Poitiers 1431. Catania 1434. Bordeaux 1441. Barcelona 1450. Glasgow 1451. Greifswald 1456. Freiburg 1457. Basel 1460. Bourges 1464. Munich/Munich 1472. Ingolstadt 1472. Tübingen 1477. Copenhagen 1479. Aberdeen 1494. Santiago de Compostella 1496. Madrid 1499. Valencia 1499. Wittenberg 1502

1409 **Salus populi suprema lex esto.** The Council of Pisa: Cardinals from Avignon and Rome called the council to depose "Pope" **Benedict 13** sitting in Avignon and "**Pope**" **Gregory 12** sitting in Rome to resolve the two pope reign begun in 1378. Attendees were four patriarchs, 22 cardinals and 80 bishops (along with representatives of 100 absent bishops, 87 abbots, 41 leaders of religious orders, 300 doctors of theology, and ambassadors of all the Christian kingdoms).

Citing *Salus populi suprema lex esto* /The Welfare of the Church Supersedes any Legal Considerations. They "deposed" both popes and elected **Alexander 7** (he died in a few months) and then **John 23** as pope. The two sitting popes refused to resign, so there were three "popes". (**John 23** in 1411 "excommunicated" **Hus**.)

1410 **Jan Hus** Rebellion in the Church: **Jan Hus / John Huss** (1374-1415), the popular Rector of **Karlova/ Charles** Univ. in Prague, capital of Bohemia (now the Czech Republic), influenced by **Wycliffe**, preached against the corrupt clergy and the pope's power. So in 1410, the Archbishop of Prague excommunicated **Hus** and his followers and burned **Wycliffe's** books.

1414-18 **The Schism ended** The Council of Constance /Konstanz, Germany was the high point in the Council movement to reform the Church and to end the two-pope system. In 1415, HR Emperor **Sigismund** promised **Hus** safe conduct to the Council. **Hus** came. The "deposed" but still sitting Pope **Gregory 12** killed **Hus**. Complex negotiations among the popes and their cardinals resulted in **Gregory 13** (Rome) resigning. It ended the two-pope reign. In 1417, the Council elected Pope **Martin 5**. He ruled from Rome. He agreed to convene councils every 7 years. He reaffirmed papal supremacy.(He ruled til he died in 1431 without calling a council.) The Council condemned the Jesuit doctrine of justifiable killing of tyrants.

Successive popes worked steadily to undermine the Council reforms that diminished their powers.

Hus had been widely loved and respected. His 1415 murder sparked a 20 year revolution in Bohemia. His "heresy" continued. ["A tyrant dies and his rule ends. A martyr dies and his reign begins." **Kierkegaard** 1844]. The *Constance Council* ordered **Wycliffe's** remains be dug up & burned. (This was

done 44 years after he died.) The Church has never said which pope, Rome or Avignon, was legitimate.

Limbo for babies As **Augustine's** doctrine of sending dead unbaptized babies to Hell was so clearly cruel, theologians over the centuries have devised arguments to soften the cruelty, including creating a mythical non-official non-heaven, non-hell place on the edge of Hell for unbaptized infants called limbo.

1417 Epicureanism revived: **Poggio Bracciolini**, an Italian scholar and humanist, found (possibly in a Benedictine monastery in Fulda, Hesse) a copy of **Lucretius's** *On the Nature of Things* / *De Rerum Natura*, the c.60 BC exposition of **Epicurus's** atheistic philosophy. The discovery was welcomed by scholars who were anxious to read classical philosophers.

1419+ **Prince Henry** Sea Navigation: **Prince Infante Dom Henrique, Duke of Viseu / Henry the Navigator** (1394-1460) of Portugal, a poor nation, set up his court and a school of navigation far from Lisbon at Sagres, the Southwest tip of Portugal (and Europe). Portugese sailors systematically collected wind and current records and made maps of wherever they sailed. They built astrolabes (ref. 846-*Polaris*) and trigonometric tables to determine the latitude of all the places where they sailed.

Henry advanced navigation **Henry** had German mathematicians, Italian map makers, and Jewish and Muslim scholars. With their astrolabes and the magnetic compass, they also were developing the lateen (triangular) sail (used by Arab traders) permitting ships to sail into the wind, and larger sleeker caravels, ships with multiple masts, vastly improving ocean navigation.

1421 Anti-Semitism: Quoting the Bible, Austria expelled thousands of Jews, stole their property.

1428 Christianity: **Thomas a Kempis** (1380-1471), Augustinian, wrote *The Imitation of Christ*, "At Judgment Day, we will be judged not by what we have read but how we lived. It is safer to obey than to rule." He said one could talk directly to God.

1430 Primitive England: **Aeneas Sylvius**, later the humanist Pope **Pius 2**, visited England; saw primitive huts, peat fires, no chimneys, bread unknown in places, food was vegetables, sometimes bark, swarming with vermin, no baths, no plumbing, straw beds.

c.1430 Classical Architecture revived: Florentines built in classical Roman/Greek forms, not *Middle Age* Gothic. Buildings put humans as their focus. Geometry, trigonometry, algebra were used extensively.

Perspective New Style in Painting: Florentines also began to paint in perspective, based on **al-Haytham's** research on optics and a book by **Leon Alberti**, with a vanishing point where all parallel lines converged. Never done before. Perspective was used only in Western art. It put Man's viewpoint central, created a sense of movement in space.

Perspective **Erwin Panofsky**, German American art historian, explained, "Not only did perspective elevate art to a "science," the subjective visual impression was so far rationalized that this very impression could itself become the foundation for a solidly grounded and, in an entirely modern sense, "infinite" experiential world. One could even compare the function of *Renaissance* perspective with that of critical philosophy. (1927) The result was a translation of psychophysiological space into mathematical space; in other words, an objectification of the subjective." Sienese painters didn't use perspective for 100 years. In 1420, 95% of European paintings were religious; by 1520, 80%, still a large majority.

1431 **De voluptate On Pleasure** Epicureanism: **Lorenzo Valla**, a humanist priest and court historian to the king of Naples, published *De voluptate* / *On Pleasure*. **Valla** did not mention **Lucretius's** poem, *On the Nature of Things*, but presented his treatise as a discussion of the highest good between an Epicurean Stoic and a Christian. This helped give Epicureanism credibility as a serious philosophy. (See 1473-**Lucretius**).

1431-49 Council of Basel / Ferrara / Florence: Bishops and lesser clergy (a majority) met in Basel (outside the lands of the pope and the HRE) to reform the Church (i.e., weaken the pope.). It claimed supremacy over the pope, prescribed an oath for new popes to take, and took other actions to weaken the pope. After moving to Ferrara and Florence, the council ended in Lausanne inconclusively. The weak pope survived.

1433 China retreated: As previously noted, Italian cities (mainly Venice and Genoa) monopolized trade with China through Muslim (and, until 1433, Chinese) ships. Muslim ships couldn't

China
retreated
into itself

make long sea trips. But then, the Ming Dynasty, which had dominated Indian Ocean trade with their large superior ships under **Zheng He** (ref. 1405), abruptly abandoned its Indian Ocean trading and sealed itself off from foreigners, burning **Zheng He's** ships and banning construction of seagoing ships. **Mings** closed the caravan trails connecting the East and West Road. They felt they couldn't learn anything from the inferior Western peoples.

In fact, as **Marco Polo** had said, their culture then was richer and grander than the West. But trade with the West continued without the emperor's sponsorship.

The biggest
What if?

Even though the Pacific Ocean is over twice as large as the Atlantic, the Chinese with their huge ships could easily have sailed east to America just 59 years before **Columbus** in 1492 (and 89 years before **Magellan**) as the prevailing current in the North Pacific is Easterly to North America; Southerly to South America; and the North and South Equatorial currents are Westerly back to Asia. China centrally governed, rich and self sufficient, self-centered, didn't care to explore the world.

1434 Sea trade: Dom **Gil Eannes** sailed south beyond Cape Bojadour in N.W. Africa. He brought back 200 African slaves. Portuguese sailors were deathly afraid to sail that far until **Eannes**. Formal diplomacy grew between cities in the in the West, with embassies, commercial treaties.

1442 Christian Anti-Semitism: Pope **Eugenius 4** decreed that "for all time, Christians shall not eat or drink with Jews, nor admit them to feasts, nor cohabit with them, nor bathe with them.

Christians shall not allow Jews to hold civil honors over Christians, or to exercise public offices in the state." He also remitted the sins of anyone fighting Saracens (Arab Muslims).

c.1444
Earth might
not be the
center of the
heavens

Astronomy: Cardinal **Nicholas of Kues/ Cusa** (near Trier) (1401-64), a radical Platonist, widened the gap between reason and theological teaching. He said, "One cannot say anything authoritative about God due to His incomprehensibility. One can only acknowledge this impossibility."

His *Reconciliation of Opposites* said, "If the universe is infinite, then the Earth is not necessarily, or even possibly at its center and if that is so, the Earth may well be circling the Sun. It is only the viewpoint of the observer as he stands on the Earth that makes him think it is the center of the universe.

The same would be true [for one standing on the Moon]." **Nicholas** also said that as all creation is an image of the divine, that the world is as good as it could possibly be, given its status as contingent and finite.

Donation of
Constantine

Donation of Constantine / Donato Constantino debunked: **Nicholas** asserted that the 787 Donation of Constantine document was a forgery. *Inter alia*, it referred to the bishop of Rome in 787,

1444 **Sylvester 1**, as "pope" 200 years before "pope / papa" came into use for Rome's bishop.

Lorenzo Valla, a humanist priest, court historian to King **Alfonso** of Naples, confirmed Cardinal **Nicholas of Keus's** analysis of the forgery. The Church, unaffected by facts, for centuries continued to say it was authentic. A scholar, **Valla** also said that the *Apostles Creed* had not been written by the apostles. So, the *Inquisition* found him heretical eight times, but **Alfonso** saved him from the stake.

c.1450
Neo-
Platonism

Neo-Platonism: (ref. AD 230) Around 1460, a dramatic upsurge in interest in **Plato** (as well as a mania for all things of classical Rome) arose. Grand duke **Cosimo d'Medici**, the ruler of Florence and head of the banking family, founded an academy to study **Plato**, led by the priest **Marsilio Finici**.

Cosimo told **Finici** to translate and comment on Plato's works. He taught Grammar, rhetoric, history, poetry, allegory, ethics. **Finici** sought to synthesize Christianity and Plato's works. Neo-Platonism promoted the study of all spiritual and imaginative writing, from Egyptian and Hebrew to Zoroastrianism.

This revival of Neo-Platonism was based on two central ideas, the Neo-platonic hierarchy of substances and a theory of spiritual love. Like **Aquinas**, **Plato** had postulated a hierarchy of substances, or "*great chain of being*" from plants to animals to humans to God.

People were the link between the material world and the spiritual world. People's highest duty was to rise toward a union with God. The principal Medieval question stayed "How can I be saved?"

1450+ Voyages of Discovery and Exploration: Luxury goods from China were in great demand. Genoan and Venetian merchants got rich off the trade. Prince **Henry's** men developed the Mariner's Quadrant, a star angle measuring device for one's latitude like the Greek /Arab astrolabe. It became common in the West, mostly in Portugal, easing sea travel. Prince **Henry** sponsored numerous explorers

to sub-Saharan Africa, at first to counter *Islam*, and then to find gold, grain, and a quicker route to Asia. Prince **Henry** made Portugal a first rate power. He reduced the size of the world.

c.1450 **Saving ideas** Printing: The first step of the history of preserving ideas was language, thought, and speech.

Next was writing. But a copyist would take six months to copy a book. Printing was step three.

Chinese and Koreans had been printing with movable hand carved type for over four centuries.

Printing Parts of the *Qur'an* had been block printed in Cairo in the 10th century.

Block-printed books had been printed in China since c.900 and in Germany and Holland in the 1430s.

Gutenberg printing **Johannes Gensfleisch zur Laden zum Gutenberg** (c.1400-68), a goldsmith of Mainz (near Frankfurt), developed a printing press *system* using moulded metal type, plus a stamping mold to cast type, with a

Never think invention. Think system. lead alloy (lead, tin, and antimony) for the type, plus a compatible ink with an oil base. Type was hand set in "stalks" holding the letters of a word, then placed in frames holding all the type for a given page.

It needed paper to be part of a *system*. Only after the plague (1350s) was suitable paper made in Germany from rags and clothing from the plague dead. Never think particular invention, think system.

About 1452, **Gutenberg** set up his printing press in Mainz. One of his first big orders was printing thousands of indulgences that the Church was selling. He decided to print the *Bible*, a huge project.

1452 **Slavery authorized** Slavery: After Dom **Eannes** sailed past Cape Bojadour in 1434, each year, Portuguese sailors sailed further and further south following the African coast toward the southern tip of Africa.

Killing for the Christian God Pope **Nicholas 5** authorized the Portuguese king to "attack, search out, to take their belongings, including land, "to convert them to you for your use, and your successors, and to subject, reduce to perpetual slavery the Saracens, pagans, and other enemies of Christ south of Cape Bojadour.

" He said all non-Christians were enemies of Christ. The pope repeated his directive in 1455 further legitimizing slavery for Christians. In the Congo and Benin, Muslims sold the slaves they had bought for Portuguese sugar plantations in Madeira.

1453 **The end of the HRE in the East** Constantinople: Muslim Seljuk Turks captured Constantinople, blocking the "Silk Road". They converted the Christian churches like *Hagia Sophia* into mosques, obliterating images of people.

The **Medici** invited Greek speaking refugees with Greek texts to Florence, which helped spread the *Renaissance* and revive scientific inquiry.

The Metropolitan of Moscow said Constantinople fell as it had deserted the true Orthodox faith. Blaming the victim is a common technique for clergy to explain tragedies. It is self-serving as it simply tells the victims they should be more obedient to the clergy. The HRE in the West was by then little more than a loose association of 300+ German feudal princes under the nominal head of the emperor.

c.1455+ **Feudalism weakened** Feudalism: The feudal system, was breaking down. Self-governing mercantile cities and nations were growing. Nation states, always despotic, developed out of city-states. The kings of the new nation states, France, England, the many German princes, even Spain, sought more independence from the Church.

Overview: The *Renaissance* spread slowly, from Italy throughout Europe, but not to Russia, isolated behind hostile states. Science in the West displaced traditional authorities, which Chinese and Muslim science had not done. The Ottoman Muslims banned printing in the late 1400s, isolating their scholars.

With the growing independence of non-Italian states and humanism, the pope became just one Italian prince, albeit an important one, among many Italian princes.

European State System The new national monarchies in France, Spain and England had power in their states that neither the pope nor the emperor could control. The nation state dominated men's thoughts, which destroyed what was left of the Roman belief in the unity of civilization.

During the 15th century, the modern outlook had spread to most cultivated Italians, although not for natural philosophy / science. Such respect came only in the 17th century. (**Galileo** et al)

S T Joshi: The *Renaissance* rediscovered Greco-Roman culture and the absorption of texts of **Aristotle** and other classical philosophers and scientists. which led to the scientific revolution .

Peasants were not The lower classes were unaffected: Peasants didn't read, lived on as before. For peasants, year

affected after year, things did not change. For them, the *Medieval* world was a world largely without facts, just Man's experiences. Little travel, seven miles was the longest journey one took, as it enabled a rider to return home that day. The elders and priests ruled; they were the judges.

The priest was still the source of information. Villages 50 miles apart spoke different dialects. Even *Medieval* elites / priests knew little more than **Archimedes**, except medicine from Arab scholars.

Printing exploded the spread of knowledge 1455-56 Printing the Bible: **Gutenberg** had begun to prepare to print the *Bible* in 1452. He had had to borrow to do the project. In 1455, he began printing it. Unable to pay his creditors, they took his **printer** and the project. In 1456, they printed around 158 to 180 copies of a 42 line *Bible* in Latin, most on paper, some on vellum. It was an artistic masterpiece. (49 copies have survived)

Printing spread rapidly to the cities of Europe. Printing reduced the price of books by 90%. The classical texts being printed brought long forgotten classical ideas, once rare and expensive, to the small middle class. Texts became less formal, **Boccaccio's** and **Petrarch's** ambition.

The printing press system required paper, ink, lead, molds. A fortuitous conjunction of events, rag paper made from the plague dead, the printing press system, and the sudden appearance of many worthwhile books, including Muslim translations of Greek from Constantinople, helped spread the *Renaissance*. The *format* of the new printed texts copied the dense hard to read format of then existing hand-copied texts. The format of the new books was not reader-friendly (long paragraphs, long sentences, little word spacing, rare punctuation. This inefficient format was not improved on for centuries). It is still the norm for the vast majority of "serious" books today.

Printing became one of the first capitalist enterprises. The spread of knowledge and ideas outpaced all Church efforts to control it. The printing press allowed scientists to spread their ideas widely and cheaply. It replaced the inefficient oral practice. More books were printed in the 50 years after **Gutenberg** than had ever been produced from day one.

1456 **Callixtus 3** became pope and named his nephew **Rodrigo de Borgia** as a cardinal. In 1457 became vice-chancellor of the Catholic Church. He proceeded to serve in the Curia under the next four popes, acquiring significant influence and wealth in the process. See 1492, **Rodrigo** became pope.

Epicurus's atheism was revived by printing 1473 Lucretius's 60 BC *On the Nature of Things / De Rerum Natura*, which had been found in 1417, was printed in Brescia (North Central Italy) and its knowledge and philosophy spread among the educated. It was the classical statement of the Epicurean philosophy of atheism, humanism, and atomism, with its scientific vision of the world, a scathing critique of religion and the supernatural. It showed that one could live life responsibly but with pleasure.

Classic text of atheism A few hand-copied copies had been made. (**Niccolo Machiavelli** (1532) had a copy.) Jefferson owned five printed copies. **Montaigne** (1580) quoted 450 full lines of it. **Daniel Boorstin** said **Epicurus** thus became one of the most influential figures in the *Renaissance*.

Heretics 1478 Spanish Inquisition: With Pope **Sixtus 4's** approval, King **Ferdinand 2** (1452-1516) and **Isabella 1** (1451-1504) instituted the *Spanish Inquisition* under that part of Spain under their control. **Isabella** made her confessor, **Tomas Cardinal de Torquemada**, a Dominican, as Inquisitor-General. In its first year, this *Inquisition* burnt at the stake 2,000 "heretics," fined or imprisoned for life 17,000 others. **Torquemada**, in 18 years, burnt c.10,227 persons at the stake and otherwise punished c.97,321 more. He destroyed *Hebrew Bibles*, burnt 6,000 Oriental books. One of the tortures used was waterboarding. The Crown got richer extorting vast sums to spare accused victims. Pope **Sixtus 4** named six of his "nephews" as cardinals.

1484 Christian fear of "heresy": Pope **Innocent 8**, quoting God (*Exodus 22:18*), "Thou shall not suffer a witch to live." issued the bull, *Summis Desiderantes* to two German inquisitors, **Jacob Sprenger**, Dean of the U. of Cologne, and Prior **Henrich Kramer**, Dominican monks. *Summis* authorized inquisitors in Germany to torture and kill men and women for sorcery and magic.

Innocent urged German clergy to vigorously find sorcerers, especially those who caused the weather to destroy, crops, vineyards, gardens, and meadows.

Malleus Maleficarum **Kramer and Sprenger** wrote *Malleus Maleficarum / Hammer of the Witches*, a juridical and Christian justification to persecute "witches". They defined witchcraft as female, especially midwives.

"All witchcraft comes from carnal lust, which was in women insatiable." It instructed torture for all *accused* witches. It was easy to get confessions from someone writhing on the rack, for whom only death could stop the pain. Many accounts of Satan damaging crops remain. *Not* confessing showed the Devil gave the accused strength; so there was no limit as to the cruelty of the torture used.

Hammer of Witches
Thousands of common people confessed to being a witch.

Torture for Jesus: So, under torture, in the name of God, tens of thousands of ordinary people confessed to being witches. Court records of these are still in Germany and Europe. (Pagans had rules limiting the severity of torture; Christians didn't.) From 1450-1750, an estimated c.100,000 people, 80% women, were tried for witchcraft and other heresies, including talking back to a priest, for having a child out of wedlock, for masturbating, for nagging. About 12,000 victims have been confirmed as executed. ("You don't count the dead when God's on your side." **Bob Dylan**)
Some estimates are much higher. *Malleus Maleficarum* was a best seller for 200 years.

1484
How to find and kill "witches"
was a best seller. Thou shalt not suffer a witch to live.

Cruelty sells: **Yuval Noah Harari**, a prominent current scholar, says: "When printing came to Europe, people thought it was the scientific revolution, like people doing physics. Not so. One of the biggest bestsellers was *The Hammer of the Witches*, the do-it-yourself manual to identifying and killing witches. It sold far, far more than anything [that scientists wrote]. A book says authority. People have a tendency to believe what they see in a book."
Robert Ingersoll (1870), said, "This one line, 'Thou shalt not suffer a witch to live.' [Ex. 22:18] proves beyond all reasonable doubt that the *Old Testament* was written by men, by barbarians."

1484 The Papacy: **Innocent 8** (reigned 1482-92) had one of his sons marry one of his former mistresses. He had several children and named **Giovanni de Medici** (the son of **Lorenzo de Medici**, ruler of Florence) as a cardinal at 13. (In 1513, **Giovanni** became Pope **Leo 10** by bribing cardinals.).

1486
Oration on The Dignity of Man

Humanism: **Giovanni Pico della Mirandola** (1463-94), an important *Humanist*. At 24, he wrote *Oration on The Dignity of Man* as a preface to 900 theses, which he offered to defend.
He wrote, "Man is the spiritual center of the universe," He imagined God saying to Man, "We have set you at the world's center that you mayest more easily observe whatever is in the world..so that you may fashion yourself in whatever shape you shalt prefer."

Heresy Christian fear of Learning: **Innocent 8** forbade anyone reading **Pico's** theses. The pope said 13 were heresies. He jailed Pico. **Pico** recanted. He was absolved of heresy in 1492. He died two years later at 31.

Leonardo da Vinci
greatest genius.
He caused a rebirth of science

Natural Philosophy: **Leonardo da Vinci** (1452-1519), a natural son of a Florentine notary, with no formal education, greatest genius of the Renaissance, perhaps of all time, was a talented painter, sculptor, cartographer, architect, engineer, scientist, inventor, anatomist, theorist, botanist, paleontologist, mathematician, astronomer, geologist, musician, & hydrologist.

Vinci is a village west of Florence. He caused the renaissance in science. He was the first to note the true nature of fossils. He observed capillary action of liquids in small bore tubes.

He invented the *camera obscura*, said the moon reflects sunlight; it does not generate light. He said, "All sciences are vain and full of errors, that are not born of experience, the mother of all knowledge" and "Whoever in discussion cites authority uses not intellect but memory."

He deduced that **Aristotle's** view that being at rest was not the guiding principle of physics, restlessness and force were. He seldom mentioned the Christian God in his writings, and his only vision of God was pantheistic.

Thirty years before **Francis Bacon** advocated induction, **da Vinci** wrote about its advantages.

1486
da Vinci Quotes
Experiment and observe
Nature never violates its own laws

He said his secret was he "knew how to see." He said that experiment and observation are the only reliable foundations of reasoning. Also that "Mechanics is the paradise of the mathematical sciences because by means of it one comes to the fruits of mathematics."
"All our knowledge has its origin in our perceptions." He accepted **Philiponus's** view of impetus.
In 1492, he designed a flying machine. Under twenty of his paintings survive, including the *the Last Supper* (1506), *Mona Lisa* (1506), and the *Vitruvian Man*, but thousands of annotated sketches of geology, botany, mechanical devices, medical devices, anatomy, military devices, a horizontal water turbine, architecture, animals, and 13,000 pages of notes survived.

c.1490 he said, "Nature never violates its own laws. Experience never errs." Unfortunately for

scientists and public knowledge, his detailed drawings and notes were not published for centuries.

1492 **Martin Behaim**, Nuremberg geographer, built the first globe of the world. It didn't have the Americas.

Christianity, Spain: **Ferdinand** and **Isabella** conquered Granada, Islam's last foothold in Iberia. Granada surrendered under a promise of civil and religious liberty. **Torquemada** (ref. 1478) ignored this promise; he ordered all Spanish Jews to leave Spain or convert to Christianity in four months. Torturing for Jesus: **Torquemada** used unspeakable torture on Jews and Muslims whose forced conversions to Christianity he thought insincere. Being forced, they were probably all insincere.

Pedro Arbues, a Spanish Grand Inquisitor said, "Innocent or not, let the Jew be fried."

1492 **Corrupt popes** Christianity: **Ferdinand** sent 100 African slaves to **Innocent 8** (reigned 1485-92), who kept some and gave others to cardinals and other papal officials. (Pope **Callixtus 3** in 1456 had made his nephew **Rodrigo Borgia** first as a deacon, then as a cardinal. Then in 1492, **Borgia** out-bribed other pope contenders and was voted pope **Alexander 6**.)

He had several children. He appointed his 18 year old son, **Cesare Borgia**, as a cardinal. and a nephew and the brother of one of his mistresses as cardinals). **Cesare** resigned his cardinalship and **Alexander** gave him land from the Papal States to govern. **Alexander** gave away other Church estates to his children. At 57, he took a 15 year old mistress,.

1492 **Columbus.** Americas: **Cristobal Colon / Christopher Columbus**, Italian, an experienced sailor, like most educated people believed the Earth was a sphere. The Florentine map maker, **Paolo Toscanelli** had told him "gold, silver, gems" could found by sailing west to the spice islands (Indonesia).

The Santa Maria was only 62-100 feet long. Estimates vary.

After repeated entreaties, **Ferdinand** and **Isabella** gave **Columbus** three small ships for his "*Enterprise of the Indies*" to sail west to the spice lands of the Indies. A few merchants financed him. His flagship *Santa Maria*, only about 62-100 ft long, had a deck and a crew of 40. The other ships, the *Nina* and the *Pinta* were small caravels (hulls shaped like Arab dhows), one was lateen-rigged.

Columbus was helped by the **Pinzons**, a seafaring family of Palos. Two **Pinzon** brothers captained the *Nina* and *Pinta*, a third was **Columbus's** first mate. In August 1492, they sailed from Palos to the Canaries, spent nearly one month there, then sailed west for the "Indies."

Columbus Compass: **Columbus** had a magnetic compass. (An accurate clock to calculate *longitude* had not yet been invented (See 1533, 1616, '75, 1714, '61). He had vastly underestimated the distance to the Indies, based on a map showing the Atlantic Ocean reaching Asia. This map has been lost.

Land! On October 12, after 36 days sailing from the Canaries, they landed, probably on the Bahamas islet of San Salvador. They called the inhabitants "Indians," thinking they were in the Indies of Asia that they sought. They found no gold. The *Santa Maria* grounded on Christmas eve 1492.

1493 A new world: **Columbus** (1451-1506), returned to Spain with a small amount of gold, two natives, cotton, and some animals and birds. On March 14, 1493 he gave the first written account of his voyage, written on shipboard, a letter to **Lius Santangel**, the keeper of **Ferdinand** and **Isabella's** privy purse. *De Insulis Inuentis; Epistola Christoferi Colom / Letter of Christopher Columbus concerning Newly Discovered Islands*. It was immediately printed and spread like wildfire across Europe.

He was a hero. Kings, princes, merchants, traders, scientists were energized to exploration. It panicked traders in Venice who feared losing their domination of trade with Asia. .

Second Voyage: In October, **Columbus** sailed again with 17 ships, four priests, and 1500 men. He made four trips to the New World, seeing Cuba, Puerto Rico, Bahamas, Jamaica, and South America, but not North America. Until he died, **Columbus** thought that he had reached Asia.

1493 **The Americas were not in the Bible** As agreed, he was made Admiral of the Seas and governor of lands he found. To Europeans, he found a new land. He was promised 10% of the gold he found. He described the natives as gentle, peaceful, helpful. Nonetheless, he and his men massacred or enslaved all the natives they found. To the natives of the Americas, Europeans were killers / thieves.

The Bible didn't mention the Americas. This embarrassed the Church. He never personally reached the North or South American continents. America north of Mexico, had in 1492, around

15-25 million natives in hundreds of tribes. (The prevailing currents and winds of the North Atlantic are roughly clockwise, west from the Canaries, up the Gulf Stream along America's East Coast Easterly to North Europe. The Gulf Stream warms Norway, at the same latitude as frigid Anchorage.)

Slaves in the Vatican Slavery: Despite the *Bible's* approval of slavery, a few popes did condemn slavery in limited circumstances. (Specifically, in 1435, **Eugene 4** condemned slavery in the Canary Islands. **Paul 3** in 1542 banned slavery of Amerindians who converted, but OK'ed slavery in Rome. **Urban 8** in 1639 banned enslaving South American natives who joined missionary communities. **Benedict 14** in 1741 condemned enslaving Brazilian natives), but the Church approved of slavery of Africans generally for until the 19th century.) A few Muslim today countries have slavery

Doctrine of Discovery 1493 Pope Alexander 6's bull, *Inter Caetera*, advanced the "*Doctrine of Discovery*," that European were superior to darker races and those who were the first Christians to discover new lands would own those lands and have sovereign and commercial rights over the natives living there.

1494 The Treaty of Tordesillas: Spain and Portugal agreed on a North-South line dividing the new world between themselves. **Pope Alexander 6** OK'ed it. It resulted in Brazil (mostly east of the line) becoming Portugese and the rest of South and Central America, Spanish. England, France, and other states ignored it. England and Holland took over trade with North America.

Bonfire of the Vanities 1494 Girolamo Savonarola (1452-98), Dominican priest, ruled Florence from 1494-98. He resisted the *Renaissance*, was against clerical corruption. He burned books, gaming tables, female ornaments, and cosmetics (the *Bonfire of the Vanities*), and made sodomy a capital offence. He criticized the degenerate **Alexander 6**. So **Alexander** tortured and burned him at the stake.

Epitome 1496 Astronomy: **Johann Muller von Koenigsburg / Regiomontanus** (1436-76), a German astronomer, wrote *Epitome*, an abridgment of **Ptolemy's** *Almagest*. It noted weaknesses in **Ptolemy's** system, particularly the small loops, needed to account for a planet's orbit, but retained geocentrism.

Cabot, North America 1497-98 **Giovanni Caboto/John Cabot** and his son, **Sebastian**, Venetians, sailing for **Henry 7** of England to find a northern route to Hindustan, found Labrador, Cape Breton, and the St. Lawrence river. They were the first Europeans since the Vikings known to see North America. **Henry** gave **Cabot** a pension. Sicily expelled its Jews; as did Portugal in 1497, with the normal biblical excuse, stole their property.

Sikhism 1499+ Guru **Nanak Dev** founded *Sikhism* in Punjab. Its principal belief is faith in *Waheguru*, a non-anthropomorphic universal God. It is the universe and created the cosmos. Later gurus modified its dogma.

Vasco da Gama 1497-99 Exploration: Portugese Dom **Vasco da Gama** (1462-1524), doubting **Columbus** had reached China, sailed south around West Africa and east across the Indian Ocean to Calicut, near the Southern tip of India, a trip twice as long as **Columbus's**. Sixty percent of **Da Gama's** sailors died of scurvy.

40,000 books printed by 1500 Before 1500, European civilization was land-centered. Land travel was rare and at walking or horse speed. Slavery was widespread, especially in Italy. Classical Latin (not *Medieval* Latin) became the language of Western diplomacy and scholarship.

Printing educated the literate. Printing: Most texts were printed in Greek or Latin. By 1500, books were being printed throughout Europe; 80 printing presses (in commercial towns, not universities) had printed 40,000 works. "Books" were shorter than modern books, the equivalent of modern chapters. China, with 100 million people, more than all of Europe, under the **Ming** Dynasty (1368-1644), who had defeated the Mongols, was the most powerful and advanced nation. Its own *Inquisition* condemned 10, 231 books. In Europe, the Christian Church remained supreme, closely allied with the kings and princes, its corruption was beyond imagination. Europe's population recovered to pre-plague levels. Muslims ruled far larger areas than Europeans did and had no printers.

Portugal got rich **Prince Henry's** captains did well for Portugal. (**Henry** had died in 1460.) By 1500, 700 kilos of gold and 10,000 slaves arrived yearly in Lisbon from Sub-Saharan Africa. Black tribes in Africa sold captive Blacks to Muslim slave traders who sold them to Europeans. Portugal became important.

16th Century-Rise of the West Erasmus Luther Machiavelli Printing

Church weakened 1500

Overview: For 1,000 years, Westerners had trusted the priests to achieve salvation; but now they learned that the Greeks and the Romans did no such thing. The Church weakened. In *concordats* with Austria (1448), France (1516), and Spain (1526), the pope was forced to concede far-reaching powers over their national churches, theoretically controlled by the Vatican. Kings took control of church properties. Towns and a mercantile class grew. Literacy increased slowly in towns. Italian city-states, like Milan, Florence, Venice, and Urbino, were the most advanced European cities. They and four inventions spurred the rise of secularism, the compass, gunpowder, mechanical clock, and the printing press.

The nations in the West, from the depths of the Dark Ages, were open to innovation and eager to seize power. They emerged as the dominant civilization with Christianity as its heart. By 1500, it equaled the East.

The rise of the West is the key to world history from 1500

The rise of the West is the key to world history from c.1500. Europe began to out-gun, out-invent, out-think, out-sail, out-produce, out-trade, and dominate all other civilizations. How? Many factors:

How?

Many reasons

1. All scholars spoke one language, Latin.
2. Europeans were inured to a variety of diseases.
3. The West, less inhibited by its past, adopted freely from the classical, Muslim, and Byzantine.
4. Due to printing, popular participation in economic, cultural, and political life was greater in Europe than elsewhere.
5. The West had the best military technology, like breech loading rifles.
6. The West's disunity and internal warfare and competition caused innovation and technological advance.
7. The rise of scientific inquiry.
8. The West had new measuring devices.
9. A favorable climate
10. They explored and exploited a whole new world, the Americas, first just to find gold and silver.
11. One scholar credits the rise of the West to the decimation of the trading cities to the East, Cairo, Baghdad, Samarkand, Calicut, Malacca, and Hormuz, by the great plague.
12. Another scholar posits that Islam and China disdained independent thought, so stagnated. China and Muslim countries contributed virtually nothing to the advancement of science until the 20th century.
13. The rediscovery of Roman law in 1070 had caused a new science of law and more universities.

History since 1500

"World history since 1500 may be thought of as a race between the West's growing power to molest the rest of the world and the increasingly desperate efforts of other peoples to stave Westerners off." **Wm. McNeill**

Printing in the national languages

Overview: Greek and Roman texts and new books began to be printed in the national languages, which opened up a wider market for printers, although Latin remained the language of clerics and scholars. Renaissance ideas were weakening the theocratic state. Printing was destroying the Church's monopoly of communication. Church maps did not show the New World. The West, divided into c.300+ duchies / principalities / bishoprics / free cities, was still not as grand as China.

Towns were socialistic 1500

Socialism was widespread among European towns: Towns administered the granaries, acted as banker, sold annuities on lives and inheritances. Europe became very rich from trade with Asia and the Americas. No European state dominated all others. The West adopted Chinese gunpowder and, since then, the superiority of firepower over manpower and tactics has stayed the central idea of military thinking. In the West, Arabic numerals replaced Roman numerals, greatly simplifying math.

Corrupt Church,

The Church was immensely wealthy. Theocratic rule had failed the common people. Every action by the clergy required a bribe or payment. It levied taxes, recorded births, deaths, marriages, baptisms, controlled most scholarship, large estates and the courts, ruled the Papal States, but most importantly controlled who was to go to heaven or to eternal torture in Hell. Peasants were little better off in 1500

It's the Money.

The intellectual awakening along with developments in art and architecture caused a questioning of traditional institutions. Crucifixion scenes far outnumbered nativity scenes in the Middle Ages and Renaissance. Statues of **Mary** were put in all churches.

Rebirth of Classics

Printing

Printing changed the Western world from a world without books to a world with books, a huge change.

Printing spread news and knowledge widely. It helped move respect for authority to respect for common empirical facts. Printing helped destroy the oral society. It took the monopoly on learning from universities and monasteries and gave it to the middle class, i.e., merchants, a huge shift in power. Local language scripts and spellings became standardized. "How-to" books were the most numerous. **Euclid's *Elements of Geometry*** was printed in Italian. Craftsmen began to make eyeglasses.

1500 **Knowledge Explosion continues to today** This second knowledge explosion in human history begun in Europe, continues today. The Scholastic philosophers of the 13th and 14th centuries based their work on **Aristotle**, used *deduction*, which, however, did not advance science much. Using *induction*, advocated by **da Vinci** and **Roger Bacon** (c.1267), there was great progress in sciences (partly based on Greek ideas that were dormant in Europe from c500 to c.1500). The world was Europeanized, with trade with the East.

1501 **Book burning** The Church feared dissent: Pope **Alexander 6** banned any printing in Germany without Church permission. He ordered burning all books questioning the Church's authority. So printing went to countries the pope didn't influence, like Holland. The new world inspired many books about it. Christianity: **Torquemada** gave unbaptized Muslims two months to leave Castille and Leon.

1502 **The Americas: Amerigo Vespucci**, a Florentine merchant and ship outfitter, employed by **Medici** bankers, sailed along S. America for both Spain and Portugal in 1499-1500 and 1501-2. He wrote of his travels. He was the first to say the new world was not part of Asia. His writings outsold **Columbus's**.

1507 **Naming America:** A clergyman and amateur map maker **Martin Waldseemueller** of Lorraine printed a map of the Eastern coasts of N. and S. America separate from Asia. He put the name "America" in Brazil, to honor **Amerigo Vespucci**. The map was a best seller. The name stuck.

1509 H R Emperor **Maximilian 1** authorized **Johannes Pfefferkorn**, a Jewish convert, to burn all Jewish books.

1511 **Spice Trade:** The Portugese captured Malacca (Malaysia) dominating the Strait of Malacca, the Spice Islands, and then the Moluccas in 1512. Portugal soon dominated the Asia spice trade, displacing Muslims. Spanish, English, Dutch, French, and Portugese sailed the seas.

Forests of Western Europe were cut down for the ships that the new nations' navies needed. England deforested much of Ireland around Dublin for its ships.

Erasmus, the most famous & influential humanist **Philosophy: Desiderius Erasmus** (1466-1536), born in Rotterdam, son of a priest, educated by the Brethren of the Common Life, who cared little for personal possessions, became a priest and later a monk. Essentially, he was a traveling scholar. All scholars spoke Latin. He also spoke Greek. Against Church rules, he read **Plato** and other Greek writers. He taught Greek at Cambridge for two years where he became a friend of **Thomas More**. He never returned to Holland. He became a famous scholar and diplomat. He began to translate a more accurate *Bible* in Latin, from ancient texts found in monasteries. It was printed in 1516 and was seen as more accurate than the *Vulgate*.

1511 **Praise of Folly** **Erasmus** wanted to reform the pure and simple elements of the Church that had been obscured by the excessive rationalism of Scholasticism and the corruption in the Church.

What he saw in monasteries and in Rome led him to write *Ecomium Moriae / In Praise of Folly* in seven days while visiting his friend, **Thomas More** in England. He wrote in Latin, so common people couldn't read it. It was one of the most brilliant satires in history.

Foolish monks His voluminous writings ridiculed war, self-love, lawyers, proud kings, love of material goods, the servility of courtiers, national pride, neglectful clergy, marriage, ignorant corrupt religious orders, and "brainsick foolish monks", even scientists. Every aspect of society was riddled with folly.

Praise of Folly "The [monks] have little religion in them yet are highly in love with themselves and fond admirers of their own happiness . . . They behave as if all religion consisted in minute punctilio, the precise number of knots to the tying on of their sandals . . . how broad and how long their girdles. They are pompous foolish clergy for their petty obsession with such matters as pardons and indulgences and irrelevant minutiae of dress and discipline."

"They call it a sign of holiness to be unable to read. They bray out the psalms in the churches like so many jackasses. They do not understand a word of them . . . The priests encourage them in their error."

"They calculate the time to be spent in Purgatory down to the year, month, day and hour. These

- Jackass monks** theologians are happy in their self love. They look down on all men as though they were animals that crawled along the ground.” “Closely related are those who have reached the foolish but comforting belief that if they gaze at a picture of **Polyphemus**, they will not die that day [and more examples]. Things like that are so foolish that I am almost ashamed of them myself; yet they are believed by the laity and by professors of theology.”
- Merchants are the biggest cheats.** “The merchants, however are the biggest fools of all. They carry on the most sordid business and by the most corrupt methods. Whenever it is necessary they will lie, perjure themselves, steal, cheat, and mislead the public. Nevertheless they are highly respected because of their money. There is no lack of flattering friars to kowtow to them and call them Right Honorable . . . The motive of the friars is clear enough; they are after some of the bounty.”
- Erasmus’s purpose** **Erasmus** saw the need for reform in the Church. He explained why he wrote *Praise*. “The whole world has firmly set its heart against using God-given brain, but insists on letting itself be entirely guided by its greed, its vanity, and its ignorance. Why in the name of a reasonable deity should the really few really intelligent people waste so much of their time and their effort in trying to reform the human race into something it never wanted to be? Let them be happy in their follies.”
- most popular and influential book** *Praise of Folly* was the most popular book of 16th century. It had 43 editions by 1536. It is considered one of the most influential books in the literate community of Western Civilization and one of the prime catalysts of the Reformation. It showed the clergy as unnecessary and childish. His ideas dominated intellectual Europe for a generation. He doubted the authenticity of all scriptures.
- Erasmus Quotes** He was relentless in his ridicule, including scientists. Despite his criticism, Erasmus stayed a Christian. He wanted to join Christianity with the classics. His complaint was that the whole point of Christianity had been lost. He was the first to take full advantage of the printing press. It opened the way for **Martin Luther**. *Praise* inspired other satiric attacks on corrupt and ignorant clergy.
- Erasmus: All things obey money.** “In the country of the blind, the one eyed man is king. Of two evils choose the lesser.” “Fools are without number.” “Prevention is better than cure.” “Where there’s life, there’s hope.” “War is delightful to those who have had no experience of it.” “He who allows oppression shares the crime.” “I am by truth.” “The worst peace is better than the most just war.” “Priests are zealous to increase their wealth.” “Monks roam through the world.” Speaking to the Church, he said, “By identifying the new [humanism] with heresy, you make orthodoxy synonymous with ignorance. (more **Erasmus** 1524)
- 1512 The Arts: Michelangelo Buonarriti** (1475-1564), Florentine, sculptor, painter, architect, poet, a towering figure of the *Renaissance*, after five grueling years, finished painting the Sistine Chapel. His painting expressed the six day concept of creation and new *humanism* of the time. His art influenced European art. Italian literature declined after the deaths of **Dante, Petrarch, & Boccaccio.**
- Cellini Benvenuto Cellini** (1500-1571) An adult by 15, famous sculptor and goldsmith, whose works include a bronze statue of Perseus holding the head of Medusa, now in Florence, and a magnificent gold salt cellar made for **Francis I** of France, now in a museum in Vienna.
- 1513 Piri Reis**, Ottoman admiral/ map maker, drew the most accurate map of the world on a gazelle skin, the first to show Antarctica. It had Africa, the NE of S. America and Caribbean islands, but little of N. America.
- 1512-17 Fifth Lateran Council** Church fear of heresy, *Fifth Lateran Council*: **Pope Leo 10** (1475-1521), son of **Lorenzo the Magnificent**, made a cardinal at 13 and pope at 38 through bribery (ref. 1484) led the *Council*. He condemned any teaching that the soul was mortal. The *Council* declared that no one could print a book without the local bishop’s OK. Adherents of **Averroesism** were declared heretics.
- 1514 Copernicus Astronomy:** The *Council* asked experts, including **Nicolaus Copernicus / Mikolaj Pomnik Kopernika** (1473-1543), Polish priest, a humanist, mathematician, with a doctorate in canon law who had studied astronomy, for advice regarding the Julian calendar as it was then seen to be out of sync with the seasons. **Copernicus** said reforming the calendar was premature until the movements of the Sun, Moon, and Earth could be better understood. He reviewed all the ancient texts he could, some Greek texts brought from Constantinople. He saw that a few Greeks of the Pythagorean and neo-Platonist schools had suggested an orbiting earth and that nature was understandable. He concluded a Sun-centered system of planetary motion

was better than **Ptolemy's** Earth-centered system. He had no telescope. (Invented a century later).

Planets orbit the Sun He circulated a 40 page *Commentariolus / Little Commentary*, to a few students based on his studies, describing a Sun-centered system he had devised with the planets orbiting the Sun. He said it explained some observed anomalies in the planets's orbits better than the Ptolemaic model.

He wrote there is no one center of all the celestial circles or spheres and the Earth is not the center of the universe; that all the planets revolve around the Sun, which is close to the center of the universe. He was afraid to publish it. (More **Copernicus** 1536, '40, '43, '84, 1600, '09, '32)

1514 **Heresy** Scholasticism was ridiculed: **Johann Reuchlin** (1455-1522) a German Christian, Humanist scholar, printed, anonymously, *Letters of Famous Men*. It ridiculed the 1509 burning of Jewish books.

To further the ridicule, he published also anonymously of course *Letters of Obscure Men*, a purported collection of letters by ignorant clergy to **Otruin Gratiuis**, a Dominican who epitomized the bigotry and pedantry of Scholasticism, also ridiculed and severely discredited scholastic pedantry. **Leo 10** excommunicated the anonymous authors.

1514 Word reached Spain that **Vasco Balboa** saw an ocean to the west from a mountain in Panama.

1514 **Manatus** By 1514, printer /scholar **Aldus Manatus**, a Venician, had printed, in Latin, the known works of **Plato, Pindar, Aristotle, Herodotus, Sophocles, Aristophanes, Xenophanes, Dante, Demosthenes**, and **Petrarch**, making such authors ideas available to all scholars across Europe.

1515 Slavery: **Bartolome de Las Casas** (1484-1566), a rich serf-owning Dominican friar and priest, said that when he arrived on Hispaniola (current Haiti and the Dominican Republic) in 1508, the Arawak natives had been reduced from a very roughly estimated one million in 1494 to 60,000 by slaughter, slavery, work in the gold mines and European diseases.

Influenced by *Ecclesiastes*, **Las Casas** gave up his slaves in 1515 and became the Arawak's champion for 50 years. He wrote about and spoke against the atrocities to the natives. Said, "All the peoples of mankind are human," a view not accepted by the high clergy in the Vatican. **Samuel Elliot Morrison**, a prominent US historian, in *Christopher Columbus, Mariner* similarly described the Spaniards' "complete genocide" and enslavement of the new world natives.

1516 **Heresy** Christianity: **Pietro Pomponazzi** (1462-1524), professor of Natural Philosophy at Padua, described the spirit of the *Renaissance* in *On the Immortality of the Soul*. He said that as an Aristotelian he could not prove the existence of the soul; that an ethical system based on rewards and punishments after death was meaningless. He rejected the idea that people needed the threat of Hell to act morally. He said that demons and angels don't exist.

So, he said, devise a system related to this life. "The reward of virtue is virtue itself."

Aristotle's ideas, as interpreted by **Aquinas**, had become Christian dogma.

So any attack on **Aristotle** was heresy. **Pomponazzi** said that **Aquinas** misread **Aristotle's** theory of the active and passive intellect. All **Pomponazzi's** books treated the soul as mortal, contrary to **Leo 10's** condemnation. The Church burned his book.

1516 **Thomas More, Utopia: England was primitive.** **Sir Thomas More** (1477-1535), lawyer, statesman, Speaker of the House of Commons, Privy Counselor, Lord Chancellor (so second most important man in England) good friend of **Erasmus**, sought radical reform in society and more rational dogma. England at the time was primitive. Nobles had kicked out peasant farmers to raise sheep, as wool was more profitable. England had no hospitals, no poor houses, sickness pervaded the land, streets were filled with offal and filthy puddles, no clean water, the poor were left to die on the side of roads.

Rich men rob, cheat, and abuse workers **More** said, "Rich men invent and devise all means and crafts, first how to keep safely . . . that which they have unjustly obtained..and next how to hire and abuse the work and labor of the poor for as little money as may be." He was contemptuous of the superstitious clergy.

More published *Utopia* (means no place) in Latin, his greatest work, with some modern ideas.. It described a community where everything is done in the best possible way, with communal

1516 ownership of land, all houses the same. Its politics was democratic. Its economics communistic.

Utopia banned lawyers. He coined the word *communism*, favored educating men and

women, with religious tolerance, even for atheists. Cosmetics and gambling were banned. Men and women dressed the same. Divorce was legal. He said, "Everyone has by the law of nature the right to such portion of the Earth as necessary for his subsistence."

Utopia was no utopia for slaves

Permission was needed to leave town. One big dark side. Slaves did the hard work. *Utopia* was translated into English only in 1551. As a parent, **More** loved and educated his daughters. Catholics and Anglicans have both made him a saint. As Chancellor, he had heretics tortured and persons owning a *Bible* in English persecuted.

Other Utopian books

The idea of an egalitarian society was rare but not new. **Lieh Tzu**, in China, c.200 BC wrote of an egalitarian society. **Plato's Republic** was utopian and authoritarian. Utopian tracts were later written by **Johannes Andreae** in 1619, **Tommaso Campanella** in 1623, **Francis Bacon** in 1627 (see 1592, '97, 1605, '20), **James Harrington** in 1656, **Francois Fenelon** in 1699, **Louis-Sebastien Mercier** in 1770, **Thomas Spence** in 1803(1775), and **Etienne Cabot** in 1840.

Beer **Wilhelm 4**, Duke of Bavaria, issued a beer purity law, *Reinheitsgebot*, allowing only water, barley, & hops.

Corruption
It's the money

Christianity: The clergy was corrupt, greedy, incompetent, but powerful as the only game in town. Most importantly, it had a monopoly on salvation. Church offices were bought and sold. Priests were married and/or had mistresses. Monks carried relics and charged a fee to touch them. Twelve monks' orders and churches had **Jesus's** foreskin as a relic.

Indulgences were sold on commission

It's the money.

Pope Weakened: Pope **Leo 10** (ref 1484, '87) was forced to let French King Francis 1 appoint bishops and abbots. Bishops sold indulgences until **Leo** prohibited them and took over the business himself. **Leo** then appointed agencies, principally the mendicant orders (those supported by begging), to sell indulgences at a commission up to 50%. They were sold widely to pay for a new St. **Peter's** basilica. For German speaking areas, **Leo** appointed Dominicans. **Johann Tetzel**, a Dominican monk, went from town to town selling indulgences even for dead relatives presumably in Purgatory, with a menu listing prices for different sins.

1517 Money: **Copernicus** (ref 1512, '14) developed the quantity theory of money and stated the earliest iteration of **Gresham's law**: ("Bad money drives out good." Namely, if there are two forms of commodity money in circulation, which are both accepted by law as having similar *face value*, the money backed by a more valuable commodity will gradually disappear from circulation.).

1517
Martin Luther

Protestant Revolt: **Martin Luther** (1483-1546) was an Augustinian monk and professor of theology at the new (1502) University of Wittenberg. He had read **Erasmus** and other Christian *humanists*.

95 Theses
Reformation

Selling indulgences so corruptly was the last straw for him. Repelled by the corruption in the Church, particularly **Tetzel**, **Luther** printed and sent to his archbishop in Mainz his *Disputation on the Power and Efficacy of Indulgences* (in Latin), later known as his *95 Theses*. He may have nailed a copy to the door of All Saints Church in Wittenberg. *Thesis 27* said, "There is no Divine authority that the soul flies out of Purgatory as the money clinks in the till," a sales pitch of **Tetzel**. (The *Hebrew Bible* had a list of payments and sacrifices to atone for various sins.)

Luther hated reason, libraries, Aristotle, the pope, women, witches, peasants, the Mass, sacraments, saints, Jews, monasteries, Muslims, & Catholics.

Reading the Bible: **Augustine** had called the literal interpretation of the *Bible* "naive literalism." Not **Luther**. He took the Bible literally. He rejected allegorical interpretations. He said, "The ungodly papists prefer the authority of the Church far above God's word."

Due to **Augustine**, the literal reading of the *Bible* was not particularly important until **Luther**. Taking the *Bible* literally has caused embarrassment to educated Christians ever since.

Luther didn't take *everything* literally. In his German translation of a passage in 1522, he inserted the word "alone" after the word "faith," as necessary for salvation, saying, "It's my Bible."

He said persons could be saved by faith in Jesus alone rather than the Church's teaching that Man needed both faith and good works. He said people do good works, but out of gratitude to God. The basic issue was, is the Bible true because or the church, or is the Church true because of the Bible? **Luther** also differed with Roman Christian dogma in several respects, namely

Purgatory, devotion to **Mary**, most of the sacraments, priestly celibacy, and papal rule.

He rationalized the Bible's creation

He excused the *Bible* contradictions. Said, "The Holy Spirit has an eye only to substance and is not bound by words," "Universities only ought to turn out men who are experts in the Holy Scriptures." He reconciled the *Bible's* creation contradictions. He said the world and all its

contra-dictions creatures were created in six days and by a miracle the whole creation was instantaneous.
A significant portion of Christians even today do not have **Luther's** personal view of reading the *Bible*. This portion believes the precise words of the *Bible* must be taken literally.

Luther resisted the *Renaissance*. "The aggregation of large libraries tends to divert men's thoughts from the one great book, the source of authority, the *Bible*, which ought, day and night, to be in everyone's hand." Ritual was secondary. He said that **Aristotle** was "truly a devil, a horrid calumniator, a wicked sycophant, a goat, a prince of darkness, a beast, and professed liar."

Luther said there was no need for sacraments and priests. He spread his view through pamphlets and public debates, in German, not Latin. His criticisms were distributed throughout Europe.

His ideas, the Protestant Revolt a/k/a the Reformation, started slowly but inexorably. He burnt volumes of canon law, saying that they were meant to subvert civil government (i.e., his patrons, the German princes), only to exalt the pope. Said, "Print is the best of God's inventions.

Like **Mohammed** and **Erasmus**, **Luther** at first only wanted to bring his Church back to its holy original pure roots. The Vatican's stupid hostility caused him to feel he had to oppose it.

He helped the princes evade Vatican taxes. This helped spread the Protestant Revolt.

Luther said each person can read the *Bible* as he wants. Many did, and their different interpretations, even on minor points, gave rise to many different sects. Various factors helped spread his ideas, later to be called the Protestant Revolt, including a rising sense of nationalism, the invention of printing, the rise of *humanism*, the intellectual barrenness of scholastic theology, and the corruption and low intellect of priests. But most importantly, it flourished as it let German ruling princes avoid the Church's taxes and still claim allegiance to **Jesus**. **Luther** broke the unity of Christendom. The Roman Christian Church became just one state in Europe, not the supreme ruler of all states.

Luther agreed. Ask and ye shall receive

Luther upended Europe for two centuries. He said, "The [Roman] Mass is the greatest blasphemy of God, and the highest idolatry upon Earth, an abomination the like of which has never been in Christendom since the time of the Apostles." He wanted everyone to be able to read the *Bible*, so he supported free education for all German youth. He translated the *Bible* into German.

Luther's Bible repeated **Jesus's** promise in *Matt 21:22* (and other passages), "All who call on God in true faith, earnestly from the heart . . . will receive what they have asked for and desired."

His theology justified serfdom for the princes' benefit.

Luther approved of serfdom. "An earthly kingdom cannot exist without inequality. Some must be free, others serfs, some rulers, some subjects." "As to the common people . . . one has to be hard with them and see that they do their work and that under the threat of the sword and the law they comply with the observances of piety, just as you chain up wild beasts so as to get a peaceful life." He told the princes to take lands of those faithful to the Roman Christian Church. It changed its name to Roman Catholic Church. Catholic means Universal.

The Church renamed The Roman "Catholic" Church

Erasmus at first favored **Luther's** movement for the sake of freedom of conscience and because he agreed with **Luther's** criticisms of the corruption in the Church. But later he disagreed with **Luther's** dogma and his derogation of human reason and opposed **Luther**. He said **Luther** was "guilty of two great crimes, he struck the Pope in his crown, and the monks in their belly."

1519 **Ulrich Zwingli** (1484-1536), Swiss priest, inspired by **Erasmus**, organized cantons to Protestantism.

1519 Exploration: Fernao de Magalhaes / Fernand Magellan (1480-1521). Portugese, sailed with 5 ships and 270 men to see if sailing west from Spain was feasible to get spices from the Indies. (See 1522)

1519+ America

Europeans began to explore the new world for "gold, glory, and God." In the New World, there were no known large animals suitable to pull plows or wheeled carts. Before Spaniards brought horses to America, North American Indians used dogs pulling travois to transport their possessions. Without draft animals or plows, the Indians's farming was limited to planting seeds with a pointed stick.

Llamas and alpacas in the Andes could carry some goods but weren't strong enough to ride or pull carts or plows. The most advanced Amerindian civilization was the Mayan. It was defunct by c.950. The Incas in Peru and the Aztecs in Mexico were not as advanced technologically as Sumerians of 3,000 years prior. **Jared Diamond**, a current scholar, credits geographic factors.

Amerindians had no potter's wheel, no plow, no wheeled carts, no metallurgy, no merchant class. But they had gods, ethical codes, calendars, and medicines from plants, equal to the Europeans.

Mexico, Aztecs

The Aztec empire, ruled by **Montezuma**, had c5-6 million subjects, Mexico City had 200,000 people, had built huge pyramids, used irrigation and crop diversification, wrote with primitive pictographs, developed a highly accurate calendar, and used positional notation for math.

The Aztecs, like many cultures, believed that they were the Chosen People.

The scope of their human sacrifice was immense. The precise number is unknown.

1520 **Hernan Cortes/Cortez**, a near illiterate conquistador, landed in Mexico with 11 ships, 13 horses, and 668 men. He captured **Montezuma** and began to loot the Aztec gold. The Aztecs drove his men out. But then smallpox brought by a Spanish slave of **Cortez**, within six months killed from 1/4 to 1/2 of Aztecs. **Cortez** then destroyed the weakened Aztec empire in a year. Mexico was named New Spain.

Conquistadores seeking gold and missionaries flooded America. The Aztecs in Mexico and Incas in Peru were unaware of each other. Aztecs were unaware of the Incan potato, the Peruvian staple..

For 300 years, far more slaves went to the Americas than white Europeans.

Dominicans led the criticism of slavery in the Americas, but also manned the *Holy Inquisition*.

1520 Eurasian diseases killed American Indians

European diseases: Europeans brought Eurasian measles, cholera, influenza, plague, TB, and typhus, which decimated Amerindians far more than the murderous conquistadores, especially in the Mississippi River System. Hispaniola's population was decimated, rough estimates vary from 2/3 to 9/10. **De las Casas** (ref. 1515) had said 98% were wiped out.

The Americas were a huge shock to the European and Christian psyche as they weren't mentioned in the Bible. Its existence, its inhabitants (Were they true humans?), and its effect on Europeans' view of history. Gold was the focus of the early explorers and conquistadores.

The genuine riches of the Americas were slow in being recognized.

Address to the Christian Nobility of the German Nation

Protestant Revolt: By 1520, **Luther's** various writings numbered over 300,000 copies. He said, "The Roman church, once the holiest of all, has become the most licentious den of thieves, the most shameless of all brothels, the kingdom of sin, death, and Hell." His dispute with the church was irrevocable. His *An den Christlichen Adel Deutscher Nation / An Address to the Christian Nobility of the German Nation* was his most influential writing. He wrote as a patriotic German, not as a churchman. It was filled with anger and sorrow at the tyranny, greed and extravagant lifestyle of the pope, the cardinals, and the Church bureaucracy. It was an argument for civil power.

Luther's proposed reforms Basically, end papal control.

1520 He indicted the whole papal system. "With good reason we hang robbers and behead brigands; then why leave free the worst robber and brigand [**Leo 10**] that has ever appeared on Earth or ever will?"

He proposed reforms. The Church should have no authority in secular affairs. The Church's revenue should be reduced to one year's expenses. Reduce the number of cardinals to 12.

German Church affairs should be decided in Germany by a German primate. He wanted laws against luxury in clothing, against excessive eating and drinking, against the spice trade, and against usurious lending. End clergy celibacy. Clergy should be permitted to marry because they needed housekeepers. Reform the way the poor were cared for. Reduce the number of festivals.

Suppress town-maintained brothels. End pilgrimages. Overall, free the state from papal control.

1521 Hier stehe Ich

HR Emperor **Charles 5** ordered **Luther** to appear before *Diet (Congress) of Worms*. He was asked to repent. He gave a long speech which reputedly ended with "*Hier stehe Ich. Ich kann nichts anders.*" (Here I stand. I can not do otherwise). The *Diet* put him under the ban of the empire, his works to be burned, and for him to be arrested. He was excommunicated. He escaped to the castle of Prince **Wartburg** in Thuringia. The Diet prohibited all new religious doctrines in Germany.

1522 Magellan's survivors

Exploration: 18 haggard surviving crew in one ship of **Magellan** (ref 1519) laden with spices returned to Seville from the first trip around the world. They had sailed from Spain around the South of South America (Cape Horn) west across the Pacific Ocean, named as it was so calm. 99 days to cross the Pacific to Guam. The going was brutal, biscuits with worms and rat urine, putrid water, leather to eat. Most sailors died. **Magellan** was killed fighting natives in the Philippines. The route was too long to be commercially viable. Some Christians still doubted the world was round.

1523 **Erasmus** printed *Colloquia Familia / Adages, Familiar Quotations from the Classics*, a compendium of satirical comments on women, monks, lawyers, and anti-humanist forces.

It was immensely popular. It kept selling out. 120 editions were printed by 1570.

1524 **Luther** freed civil law from religious law. Christian law had only enforced contracts that were equitable. Now all contracts were enforced. The Church called him a bastard, an atheist, a drunk, a blasphemer.

**Luther Quotes
Burn the
witches** Regarding witches, "When I was a child there were many witches, and they bewitched both cattle and men, especially children." "I would have no compassion for a witch. I would burn them all." Also, "He was vain, conceited. He said, "Whoever teaches differently from what I have taught, or whoever condemns me therein, he condemns God and must remain a child of Hell."

**What
Luther
believed** **Luther** was, like most people, ignorant. He said that fossils were the result of Noah's flood, that flies were sent by the Devil to vex him while he was reading, that demons in clouds caused hail and thunder, that demons live in many lands, but particularly in Prussia, that "all wild animals have black flesh, while tame animals have white flesh. And, "We know from **Moses** that the Earth is just 6,000 years old." Also, "all sicknesses were caused by Satan, who poisons the air. "

**Nonsense
beliefs of
Luther** **Luther** believed nonsense. In addition to the above, he said, "There is a lake near Lucerne, where the Devil gives himself up to all kinds of infamous practices. In my own country upon a high mountain called Poltersberg, there is a pool. If one throws a stone into it, instantly a storm arises and the whole surrounding countryside is overwhelmed by it. The lake is full of demons. The Devil holds them captive there." Also, Snakes and monkeys are subjected to the demons more than other animals. Satan lives in them." "All beings deprived of reason are thus afflicted only by the Devil." He said all animals were created at once time. His book, *Against the Roman Papacy, an Institution of the Devil*, he said, the pope was "a true werewolf," a "farting ass," a "brothel-keeper over all brothel-keepers."

**Women are
wives or
prostitutes.
Several
wives is ok.
Men under-
stand better** Male superiority: **Luther** said women were inferior, "The word . . . of God is quite clear, that women were made to be wives or prostitutes. . . The rule remains with the husband, and the wife is compelled to obey him by God's command. Men have broad and large chests, and small narrow hips and have more understanding than women, who have small and narrow chests and broad hips-to the end they should remain at home, sit still, keep house, and bear and bring up children." "I cannot forbid a man to marry several wives, for it does not contradict scriptures."

**Problem of
Suffering** His answer to *The Problem of Suffering*, he said, "God's ways aren't our ways. Don't try to understand God's ways. Believe in the promise of salvation." (This is the *Man-has-limited-ability* defense).

1524 Like **Dante**, **Wycliffe**, **Hus**, and the Waldensians, **Luther** said civil authority was derived directly from God, without papal intercession. He cited **Ockham** in his denunciation of the papacy. He said the clerical hierarchy and canon law were unchristian and worldly. Though important in the West, Protestantism did not spread beyond Western Europe. Eastern Orthodox Christianity, ruled from Constantinople, ignored it.

1524-25 **Luther:
Cut their
throats.
Burn, slay,
crush the
peasants.** **Luther** catered to his prince patrons. As noted, he gave them an excuse to avoid Vatican taxes. But more, when the Protestant princes were in conflict with HR Emperor **Charles 5**, then in Spain, **Luther** said that the newly Protestant German princes had the right to resist the emperor, and that rulers should be obeyed only so long as they were just and not tyrannical. - Also when the peasants revolted against his patron princes, Luther invoked God to abandon them, saying, "God would prefer to suffer the government to exist no matter how evil, rather than allow the rabble to riot, no matter how justified they are. If the peasants are in open rebellion, then they are outside the law of God." **Luther** advised the princes, "Strike with the sword, kill, cut their throats, burn, slay, crush the murderous and rapacious peasants."

**God told
me so.** He said that the Lord God had told him to order the peasants slain. The German princes slaughtered around 100,000 of the 300,000 poorly armed peasants.

Again, when **Luther** was at first in revolt against the Church, he demanded individual freedom of conscience for all, especially himself ("*Hier stehe Ich, Ich kann nicht anders*"). Anabaptists believed that they should not participate in or be governed by the secular state. Anabaptists considered all believers equal. They said that the Last Supper was a meal of fellowship following **Jesus'** example.

1524 **Hypocrisy** **But**, when confronted with the rise of the *Anabaptists* and other more iconoclastic sects seeking a purer Christianity, **Luther** asserted that the state should tolerate only certain sects and persecute

It's the money others. *Anabaptists* were viciously persecuted and killed by both Roman Catholics and the new Christian sects, soon to be called Protestants. **Luther's** theological hypocrisy is not unique.

Many clerics's theological positions are serendipitously identical to their patron's economic interests. "Same with some academic "studies." "He that pays the piper, plays the tune."

On Free Will c.1524 Christianity: The Rome based Christian Church's reaction to **Luther** was foolish. It viciously attacked all Protestant dissent and continued its corrupt ways. **Also**, Archbishop **Carranza** of Toledo, a scholar and admirer of **Erasmus** was imprisoned for 17 years before his acquittal of heresy. **Erasmus's** (ref. 1511) *On Free Will*, ridiculed **Luther's** view on *free will*. He argued that human effort cooperates in the process of sanctification. He did not encourage any definite action.

De servo arbitrio. It's the money. 1525 To counter **Erasmus's** essay *On Free Will*, **Luther** wrote *De servo arbitrio/On the Bondage of the Will*. It attacked **Erasmus** and claimed that he was not a Christian. **Luther** accepted the cruelty of *Original Sin*. He preached the complete sovereignty of God. Said unredeemed humans are dominated by Satan, unless overpowered by a stronger power, God. Denouncing a "heretic" netted the Church 2/3 of the "heretic's" estate and the informant 1/3, a blatant and effective invitation for false accusations.

No Original Sin **Zwingli**: Original Sin, **Ulrich Zwingli**: Among Protestant leaders, Ulrich Zwingli (ref. 1519), Swiss, openly repudiated the doctrine of *Original Sin*. Like **Aquinas**, he said that one cannot sin until one is aware of the sin. He agreed that only through the Church may one avoid Hell. **Calvin** and **Jonathan Edwards** and other new sects accepted *Original Sin*, even for infants. Hell was a fact of life at the time for most Christians. It was a significant item in their store of beliefs, and was, accordingly, a conviction which gave shape to their lives. **Luther's** movement became Lutheranism.

Humanism Concurrently, humanism strengthened. As princes diminished the pope's *political* power, humanism diminished the Christian churches' moral power.

Humanism gave people pride of place in the world based on Man's power to reason. *Cloverdale's Bible, Matthew's Bible, the Great Bible, the Geneva Bible, the Douai Bible* all appeared in the 1500s.

The New World 1526 The Americas: The **Inca** family, perhaps a dozen people, in Cuzco ruled an empire stretching from Quito to Santiago, Chile, over 3,000 miles. In the 1400s, they had built, used, and abandoned Machu Picchu, a city on a mountain built with precise stonework but no arches. A smallpox epidemic spread from Spanish conquistadores killed the *Incan* emperor and most of his court. The **Incas** also sacrificed humans, but far fewer than the Aztecs. *Inti*, the Inca's Sun god, had its own priesthood. To show their divine connection with their Sun god, Inca emperors wore suits of polished metal to reflect the Sun's rays. Thunder, lightning, the moon, stars, were also worshiped.

1527 King **Gustav Vasa** of Sweden and Finland took over the Roman Christian Church there and all its property. He decreed that the "pure word of God", Lutheranism, was to be taught in all schools.

Paracelsus Medicine: An iconoclastic doctor, **Paracelsus**, in Basel, cured a printer, who then spread his fame. **Paracelsus** threw a medical text of **Avicenna** into a student bonfire. He sparked new interest in better methods of cure. Before him, a disease was thought to be an unbalance of bodily fluids. He said each disease was caused by a specific agent outside the body and had a specific locus in the body. He sought chemicals to cure each disease. This was a precursor of *Germ Theory*, 1847, '62.

1529 HRE **Charles** at the Diet of Speyer forbade any extension of the Reformation pending a council to be held in 1530. In 1530, he said he would wipe out the Lutheran "heresy." Five princes and 14 cities drafted a "Protest", a formal legal appeal. Thus **Luther** and his followers began to be called "Protestants".

Wars of religion 1525-1700 Wars between the Roman Christians and Protestants, fed by the mutual intolerance of **Luther** and the Roman Christians, engulfed Europe. The Roman Christian Church revived its *Holy Inquisition*. Disdain for the authority of the pope and numerous Protestant sects developed as different groups interpreted the *Bible* in their own fashion, often accusing each other of being atheistic. Protestant "commissioners" went to even small parish churches destroying all images. Calvinism, a very severe sect, grew strong in nominally Catholic France. Caliph **Suleiman** besieged Vienna, unsuccessfully.

1530 **Luther** and **Zwingli** met, agreed on 14 of 15 articles of faith for Lutherans, but disagreed on the significance of the Lord's Supper. In 1531, **Luther** rejoiced when **Zwingli** died (at 47).

1532 **Gunpowder is incense to the Lord** Killing for God: **Gonzalo Fernández de Oviedo** (1478–1557), a noble in the court of **Ferdinand** and **Isabella** wrote the first comprehensive history of Spanish America. He said, “To use gunpowder against pagans (Amerindians) is to offer incense to the Lord.” **Bartolome de Las Casas** (ref. 1515, ‘20), the champion of the natives and a contemporary of **Oviedo**, denounced **Oviedo** as “one of the greatest tyrants, thieves, and destroyers of the Indies, whose *Historia* contains almost as many lies as pages.”

Pizarro betrayed Atahualpa and looted Peru Killing for gold: During 1532–34, **Francisco Pizarro** (c.1470–1542), near illiterate, and 168 men, 62 on horseback (magic to **Incans**), searching for gold, captured the new **Inca** emperor **Atahualpa**, extorted vast amounts of gold as ransom and then killed him. **Atahualpa** had never learned of the Spanish conquest of Panama, just 600 miles north. **Incans** had bronze knives. The Incan empire, based completely on its emperor, disintegrated in three years.

1532 **Real-politik** Political Theory, *real politik*: **Niccolo Machiavelli / Nicholas Machiavel** (1469–1527), a Florentine diplomat out of favor, sought to regain political office. When a diplomat, he had been on a mission to **Cesare Borgia**, a cardinal and son of Pope **Alexander 6**. He had never seen such a politician as **Borgia**. **Borgia** exhibited extraordinary political audacity, prudence, cruelty, deceit, firmness and flexibility. In 1513, **Machiavelli** wrote and privately printed *The Prince / Il Principe*, based on **Borgia**. He dedicated it **Lorenzo the Magnificent**, the ruler of Florence, to gain his favor. **Lorenzo** did not respond. The book was not publicly distributed so did not reach the general body of knowledge at the time. It was publicly published in 1532 (after **Machiavelli’s** death) with the pope’s OK. It was a manual for how a prince should gain power and govern, basically with lies and deceit. It said politics had only one object, success. It regarded the state as beyond good and evil—an end in itself. It was the first purely secular study of Political Theory in the West.

1532 **Machiavelli said the Church’s ruin was near** The Church: **Machiavelli** also foresaw the tensions building in the Church. He wrote, “Whoever examines the principles upon which [Christianity] is founded, and sees how widely different those principles its present practice and application are, will judge that her ruin or chastisement are near at hand.” (In a generation, the Roman Christian Church had lost half of Europe). **Machiavelli** saw Christianity as a rival to a prince’s power to govern due to its influence over the people. He rejected the notion that popes were superior to kings.

Machiavelli Quotes: Fear works better than love. *Principe* advised princes, “As love and fear can hardly exist together, if we must choose between them, it is far safer to be feared than loved.” (**Aristotle** had said the same) And “If one must be cruel, be cruel quickly, and cause great injuries, for small injuries do not keep a one from revenge. Be cunning as a fox and as fierce as a lion.” “Princes should leave things of injustice and envy to the ministry and execution of others, but acts of favor and grace are to be performed by themselves.”

All armed prophets win. “The chief foundations of all states. . .are good laws and good arms. A prince should therefore have no other aim or thought, nor take up any other thing for his study, but war and its organization and discipline. All armed prophets have been victorious, and all unarmed prophets have been destroyed. But above all, a prince must not take a man’s land, for men forget the death of their fathers faster than the loss of the land they inherited from him.”

Men are stupid, so clever men always win. “The prince must use the Church’s influence by cultivating an appearance of mildness, sincerity, and religiousness, but ignore such noble traits when necessary.” “A prince should use violence, cruelty, lies, and hypocrisy whenever political success requires it. Any act to gain or retain power is permissible. Imperialism, the expansion of the state, is the basic trait of the state. As men are stupid, deceit is easy, and the clever man will always win.”

Most necessary advice for a prince: “Appear” religious. Be ruthless A, if not *the*, basic problem for a ruler, is how to keep in power, that is, to keep the common people docile. **Machiavelli** exposed religion as the most effective system of controlling the people. He wrote, “To a prince, there is nothing more necessary than to appear religious. There has never been, in any country, an extraordinary legislator who has not had recourse to God; for otherwise his laws would not have been accepted.” “Prudent rulers pay homage to popular superstitions.” “Although fraud in all other actions is odious, yet in matters of war it is laudable and glorious.”

Prudent princes don’t keep “A prudent prince neither can nor ought to keep his word when to keep it is harmful to him and if the causes which led him to make the pledge are removed.” **Machiavelli** said that religion and patriotism were simply tools for a prince to use to stay in power.

their word The Church did not want its non-divine side exposed. So *The Council of Trent* ordered his works destroyed. He was denounced by Catholic and Protestant clerics. He argued that only under conditions of relative economic equality could a republic endure. Otherwise corruption or revolution would result.

1532

He further said, "The first method for estimating the intelligence of a ruler is to look at the men he has around him." "There are three classes of intellects: one which comprehends by itself; another which appreciates what others comprehend; and a third which neither comprehends by itself nor by the showing of others. The first is the most excellent, the second is good, the third is useless."

Political Theory **Frederick Schuman** (1904-81), an eminent political scientist, used shorthand to describe the 3 stages of control of a conquered people as *Force, Fraud, and Favors*. Namely, a country, tribe, or group is first defeated militarily and the victors rule by force and fear. Eventually force becomes impractical, too expensive.

Force, Fraud, Favors

(Edmund Burke, the father of Conservatism, later explained, "The use of force alone is but temporary. It may subdue for a moment; but it does not remove the necessity of subduing again.

And a nation is not governed which is perpetually to be conquered.") So, when force becomes too expensive or impractical, rulers (kings, princes, dictators), ruled as Machiavelli advised, cynically, by fraud, superstition, religion, and/or ideologies like nationalism, patriotism, or ethnic chauvinism.

Ancient examples of rulers using fraud to rule Rule by fraud has a long history: During the 23rd century BC, the Mesopotamian ruler **aa-Sin of Akkad** declared himself a god. He took his name as it meant "Beloved of the Moon God *Sîn*." He took the title, "God of Akkad." A stele was erected to commemorate a military victory. The stele depicts him as a super-human being who wore attributes of kings and symbols of divinity, such as the horned crown.

Gilgamesh, the king of Sumerians around 2,000-1450 BC was claimed in the *Epic of Gilgamesh* (transcribed around 2000 BC) to be 2/3 divine, his mother a goddess and his father part divine. The first rulers of Sumer were priests. Kings came later.

Shulgi (2095-2049 BC), the second king of the Third Dynasty of Ur, declared himself a god.

Shu-Sin, who was probably **Shulgi's** son or grandson, used an extensive program of self-worship.

Hammurabi said he got his *laws* from *Shamash*, the Mesopotamian Sun god of justice, morality, and truth.

Moses said that he received the *Ten Commandments* and *precepts* from Yahweh, the Lord, on Mt. Sinai.

The **Zhou** Dynasty (1046 -771 BC) Rulers in China claimed a "Mandate of Heaven" to rule, with a religious compact between the **Zhou** people and their supreme god in heaven who conferred legitimate power on only one person, the **Zhou** ruler.

Similarly, for Egyptians, the god Thoth gave the laws to **Menes** (3200 BC)

Use of religion to rule **Cyrus** (600 BC), "I am **Cyrus**, King of the World, King of Babylon, Sumer and Akkad. When I entered Babylon peacefully, Marduk, the great lord, gave me a magnanimous heart of one who loves Babylon, and I worship him daily. At the command of Marduk..I settled the gods of Sumer and Akkad in pleasing abodes."

Aristotle **Aristotle**, "A tyrant must put on the appearance of uncommon devotion to religion. Subjects are less apprehensive of illegal treatment from a ruler whom they consider god-fearing and pious."

Seneca **Lucius Annaeus Seneca, (Seneca the Younger)**, Religion is regarded by the common people as true, by the wise as false, and by the rulers as useful.

Diodorus Siculus of Sicily, a Greek historian, "The myths about Hades and the gods, though they are pure invention, help to make men virtuous."

Lucretius **Titus Lucretius Carus**, (ref 60 BC) *On the Nature of Things / de Rerum Natura*. "All religions are equally sublime to the ignorant, useful to the politician, and ridiculous to the philosopher."

Shinto, supported by Japanese emperors, teaches that the emperor is a descendent of gods.

Numa Pompilius, second king of Rome, said that the divine nymph Egeria gave him his civil laws.

Gods were invented **Polybius**, (125 BC) Greek historian, "The masses of the people are inconsistent, full of unruly desires, passionate and reckless of consequence. They must be filled with fears to keep them

in order. The ancients did well therefore to invent gods and the belief in punishment after death."

(1532) **Cicero**. "Roman caesars/dictators need to be legitimately able to claim divine inspiration for their edicts." **Cicero** believed that religion was necessary for the masses solely to keep them quiet.

Use of fraud to rule **Alexander** was proclaimed a god in Egypt. After **Alexander's** death, **Ptolemy 1** took over Egypt. His son, **Ptolemy 2** deified **Ptolemy 1** to declare himself pharaoh, a living god. All **Ptolemaic** rulers of Egypt declared themselves pharaohs and living gods.

In Islam, imams rule as there is no separation between the state governing and religion.

Averroes opposed **al-Ghazali's** revealing doubts about the divinity of Allah to the lower classes.

Charlemagne (800) claimed to be "crowned by God." after Pope **Leo 3** crowned him.

Divine Right Divine Right. Based on the *Bible's 1 Peter 2:17*, all kings in Europe claimed a *divine right* to rule. They claimed that they were God's deputy on Earth and their commands expressed God's wishes.

In Hindustan/India, The Hindu scripture Manusmriti states that the castes were created by God. So the ruling Brahmin caste governs over the lower castes with God on its side.

Thomas Hobbes, Religions were formed and sustained by people in power to control their subjects.

Voltaire, Tyrants will devote themselves in the name of any god to put shackles on sleeping men.

Modern Examples **John Adams**, The question is if nature's laws shall govern or priests & kings who rule by fictitious miracles. Inca emperors wore polished metal suits to reflect Sun's rays to show their connection with their Sun god.

Religion keeps the common people from murdering the rich **Napoleon Bonaparte**, "Religion is excellent stuff for keeping people quiet. Religion is what keeps the common people from murdering the rich. A nation must have a religion, and that religion must be under the control of the government. How can you have order in a state without religion? When one is dying of hunger near another who is [full], one cannot [accept it] unless a priest says, 'God wills it. It is the will of God that here on Earth there must be rich and poor, but yonder, in eternity, it will be different.'"

Examples of fraud **Frederick 2 the Great** of Prussia, "I think it better to keep silent regarding the Christian fables, which are canonized by their antiquity and the credulity of absurd and insipid people." "Religion is the idol of the mob. It adores everything it does not understand."

Madison **James Madison**, "Rulers who wish to subvert the public liberty may have found an established clergy convenient. Never have [religions] been seen the guardian of the liberties of the people."

William Hazlitt, Brit (1778-1830), philosopher, "The garb of religion is the best cloak for power."

(1532) **Robert Burton**, "The fear of some divine power keeps men in obedience. One religion is as true as another."

Rule fraud **Arthur Schopenhauer**, "Every wise prince who loves his throne..will appear [to] his people as an exemplar of true religion." "Princes use God as a kind of bogey with which to frighten grown-up children into bed, if nothing else prevails; that's why they attach such importance to the deity."

Tolstoy **Leo Tolstoy**, "Patriotism for rulers is a tool to achieve their power-hungry goals. For the ruled it means renouncing their dignity, reason, conscience, & slavish submission to those in power. Patriotism is slavery."

Karl Marx, "Religion is used in a capitalist society to keep the masses in their place by offering hope in a next life. Most of the great men of this world live as if they were atheists."

Eugene Debs, 1918, socialist, "In every age it has been the tyrant, the oppressor and the exploiter who has wrapped himself in the cloak of patriotism, or religion, or both, to deceive and overawe the people."

Nietzsche **Frederich Nietzsche**, 1883 "Morality is the best of all devices for leading mankind by the nose."

Michael Bakunin, "Until now all human history has been a perpetual and bloody immolation of poor human beings in honor of some pitiless abstraction-God, country, power of state, national honor, judicial rights."

- Jefferson** Thomas Jefferson, "In every country and in every age, the priest has been hostile to liberty. He is always in alliance with the despot, abetting his abuses in return for protection to his own."
- Joan of Arc said she was told by angels to restore the French monarchy. She was canonized in 1920.
- (1532) **Rule by fraud** Praxedis Guerrero, Mexican revolutionary, "Religion is the tool of tyrants in both home and presidential palace. Its mission is to break people's spirits. Religion is the right arm of domestic and national despots. It's all employed toward one end, to tame."
- Robert Ingersoll, In all ages hypocrites called priests have put crowns on the heads of thieves called kings.
- Kemal Atatürk, modernizer of Turkey, "He is a weak ruler who needs religion to uphold his government."
- von Bismark** Otto von Bismark, the unifier of Germany, "The idea of the Christian State. . .if it would have an assured permanence,. . . must stand on a religious foundation."
- Rule by fraud** Clarence Darrow, "Rulers have ever taught & encouraged patriotism, that they might call upon their slaves to give freely their labor to the privileged class and to freely offer up their lives when the king commands..
- Ambrose Bierce, *The Devil's Dictionary*, "Fraud, The life of commerce, the soul of religion, the bait of courtship, & the basis of political power. Patriot, the dupe of statesmen and the tool of conquerors."
- Einstein** Albert Einstein, "The minority ruling class at present has the schools and the press, usually the Church as well, under its thumb. This enables it to organize and sway the emotions of the masses, and make its tool of them."
- Mussolini** Benito Mussolini, an outspoken atheist before he was Prime Minister, paid Pope **Pius 11** for the pope's political blessing and support. The pope praised him. The pope sold out his people.
- The use of fraud to rule** Adolf Hitler, in 1933 as fuhrer, paid off the German Catholic and Protestant high clergy. In return, they publicly praised him. They too sold out their people for money. Hitler told the *German volk*, "In defending myself against the Jews, I am fighting for the Lord."
- Patriotism** Hermann Göring, Hitler's *Luftwaffe* chief, used patriotism, "Naturally the common people don't want war. It is always simple to drag them along. That is easy. All you have to do is tell them that they are being attacked, and denounce the pacifists for lack of patriotism. It works the same in every country." Also said, "God gave the savior to the German people. We have faith, deep and unquestionable faith, that [Hitler] was sent by God to save Germany."
- Any religion will do.** Dwight Eisenhower, "Our form of government has no sense unless it is founded on a deeply-felt religious faith, and I don't care what it is." (**Eisenhower** was baptized after he became president.)
- Paul Dirac, quantum physicist, "If religion is still being taught, it is because some..want to keep the lower classes quiet. Quiet people are much easier to govern. . . [and] to exploit."
- Patriotism** Ronald Reagan used patriotism. His campaign theme was, "Let's make America great again." He also disgracefully appealed to racist whites. *Inter alia*, he ridiculed "welfare queens."
- George W Bush said, "I believe that God wants me to be president." The Palestine minister related that **Bush** told him that God told him to attack *Al Qaeda* and Iraq. (Even though **Osama bin Laden** and most of the 9/11 hijackers were Saudis.)
- Use of religion & patriotism:** Donald Trump, a non-churchgoer, posed for photos "praying" with Evangelical pastors and posed for a photo in front of a Christian church holding a *Bible*. He didn't go in. His spokesperson said God wanted **Trump** to be president. **Trump's** first rally of his 2020 campaign was at a Christian Evangelical megachurch, *The King Jesus International Ministries*. His theme was "Make America Great Again"
- The slogan "America First"** At his inaugural in 2017, **Trump** said, "From this moment on, It's going to be America First." This slogan was the motto of the Ku Klux Klan and the name of the largest anti-Semitic fascist-friendly group organized in 1940-41 to help **Hitler**, the *America First Committee*. **Donald Trump** said, "If you say it enough and keep saying it, they'll start to believe you."
- Vladimir Putin allies himself with the Russian Orthodox Church, wears an Orthodox cross.

Harin Fernando, Sri Lankan MP, "Politicians will always use religion to further their agenda."

English kings are automatically head of the Anglican Church and Defender of the Faith.

Religions & ideologies, don't have to be true to control people.

Yuval Noah Harari, (ref. 1484), a current eminent historian, explained, how rulers use fraud. He said, "Scientific truths are based on facts, experiments, mathematical truths, and measurements. The other kind of truth, or the other kind of stories, are the stories that enable you to control people. They are the basis for society. Things like religions and ideologies and so forth.

And here you don't need the truth for power. Power is based on making a lot of people believe the same story. It may not be true. It's not true that if that story is false, that it will not be effective. You can have enormous social power by making a lot of people believe in fiction."

Divine legitimization

The use of religion by rulers is so common it is called "divine legitimization" by sociologists.

Gustave le Bon, French polymath in anthropology, psychology, sociology, medicine, inventor, physics. Best known for *The Crowd: A Study of the Popular Mind* (1895), a seminal work of crowd psychology, "The masses have never thirsted for truth. Who can supply them with illusions is easily their master."

- (1532) The concept of using fraud to rule is common in literature. **Critias**, a cousin of **Plato**, wrote a play wherein religion was an invented lie to keep otherwise brutish humans law-abiding. **Fyodor Dostoevski**, *The Grand Inquisitor*, cardinal and atheist explained how the clergy used lies to rule. **George Orwell's** *1984* and **Aldous Huxley's** *Brave New World* are famous political novels wherein the rulers use fraud to rule the lower classes.

Use of favors to rule

Frederick Schuman: (ref. 1532, 1939). When too many people see through the fraud, the ruling class uses *favors* to buy off the middle class, the class most likely to revolt, with favors, emoluments, limited wealth and influence.

The poor are too weak to revolt.

Why is the middle class the one most likely to revolt? **Thorstein Veblen** (1899) explained, "The abjectly poor, whose energies are absorbed by the struggle for daily sustenance, are conservative as they cannot afford the effort of making thought for the day after tomorrow."

Similarly, **Jean Paul Marat** (1743-93), a French revolutionary, "Of what use is political liberty to those who have no bread?" Also **Mahatma Gandhi**: "There are people in the world so hungry, that God cannot appear to them except in the form of bread."

The Prince detailed truthfully what ruling classes had always practiced but never publicly admitted, i.e., the hypocritical use of religion and patriotism as techniques to control the lower classes.

It was one of the most influential political texts in history. **Machiavelli** revolutionized political philosophy by shifting political thought away from the moral ground of **Aquinas's** theory of natural law toward a new purely secular practical realistic theory of statecraft, *realpolitik*.

Francis Bacon, in *Advancement of Learning* 1605, said, "We are much beholden to **Machiavel** and others that write what men do, not what they ought to do."

1532 Henry 8, England

Christianity in England: King **Henry 8** (1491-1547) asked pope **Clement 7** for an annulment from **Catherine** as she bore only a female heir, **Mary**. **Thomas More** (ref 1516), the Roman Christian Lord Chancellor, opposed any annulment and resigned. **Henry** had him killed. Pope **Clement 7** (a **Medici**) refused to annul the marriage to **Catherine**. So **Henry** disavowed the pope and declared himself head of the Christian Church in England (which owned 30% of England's land.)

- 1533 **Henry** married his mistress, **Anne Boleyn**, who had him appoint **Thomas Cranmer** as Archbishop of Canterbury, who then declared **Henry's** marriage to **Catherine** void and his marriage to **Boleyn** valid. **Boleyn** soon had a daughter, **Elizabeth 1**. Parliament obeyed Henry, he said he was "the only Supreme Head on Earth of the Church of England." The pope excommunicated **Henry** and **Cranmer**. Almost all English Christian priests meekly went along with **Henry**. The Roman Christian Church was not popular in any case as it had come with the Norman conquest.

Henry married 6 times, and, while head of the Church in England, killed wife 5, **Catherine Howard**, and wife 2, **Boleyn**, on false allegations. All told, **Henry** killed 20 peers, 4 top public servants, Lord Chancellor **More**, several heads of monasteries, and six close attendants and friends.

He never renounced the Roman Church, but he took its vast lands, monasteries, and wealth. After Henry died at 56 in 1547, the Anglican / Episcopal religion evolved from The Roman Church.

1533
**Frisis's
method to
calculate
longitude
with a clock.**

Navigation: Reiner Gemma Frisis, Dutch, said a sailor could determine longitude with a clock. How? As the Earth revolves 360 degrees of *longitude* every 24 hours, it revolves one degree every 4 minutes. Some city is picked to be city zero-degrees-longitude (London was picked in 1721). A sailor sets his clock to city zero's clock (Say noon). Wherever that sailor is, when the Sun is at its highest point above him is *his* noon. If *his* noon happens at 12:04 on his ship's clock, he knows he is one degree *longitude* west of city zero-longitude, and so on. But no accurate marine clock was made until 1761. In 1675, in the Northern hemisphere, latitude continued to be calculated by the North Star's angle above the Northern horizon or by a star chart.

Calvin:
**Religionis
Christianae
Institutio**

1536 Calvinism: John Calvin /Jehan Cauvin (1509-64) French theologian, lawyer, c.1530 left the Roman Christian Church. He was first a *Humanist*, and in 1535, at 26, he published *Institutio Religionis Christianae /Institutes of the Christian Religion*, an exposition of his religious philosophy. It was as influential to Protestantism as *Summa Theologica* was to Catholicism. It clearly reflected the thought of the entire Protestant movement (except for his, **Calvin** thus founded a new Christian faith close to Lutheranism. **Calvin** believed in predestination. (*Revelation 14:1-4* suggests only 144,000 pre-chosen will go to Heaven.), in the literal words of creation in *Genesis* and in the fixity of species.

sensus
divinitatus

Calvinism is cruel, authoritarian, systematic, and comprehensive. He revised and expanded his *Institutes* throughout his lifetime. His first draft had six chapters. The last edition, in 1559, had 80 chapters. He said that God gave humans a *sensus divinitatus*, an innate sense that God existed.

Calvin:
1. God is
sovereign.
2. Humans
are
depraved.
3. Only a
few will
be saved.

Calvin said that prohibiting priests to marry was impious tyranny, not only contrary to the word of God, but at war with every principle of justice. The three essential features of his doctrine were 1. The absolute sovereignty of God, 2. The absolute helplessness and total depravity of humans, and 3. Salvation from Hell for the elect. He said that the vast majority of men, by nature evil, are destined to be eternally damned. Only the *elect*, predestined by God will be saved and enter Heaven.

One can't know if he is in the *elect* except by an inward sign from God. He said that ordinary economic activities are callings sanctioned by God and tyrants as well as benevolent kings are put in office by God. Evil rulers must be as revered as the best of kings.

Where **Luther's** writings had been emotional outpourings, **Calvin** set down a system of reasoned, logically formulated morals, policy, and dogma. Said, "The sum of human wisdom is in two parts, knowing God (only possible by studying scripture) and knowing oneself." "It is hard to find one monastery in ten that is not more a brothel than a sanctuary of chastity. What frugality is there in their food? Monks are like so many swine fattening in a sty." (See 1541-**Calvin** ruled Geneva)

Suffering
is part of
God's plan

Calvin's answer to *The Problem of Needless or Pointless Suffering* was, He assumed a God's existence. Remember, when one assumes a God in an answer to the Problem of Evil/Suffering, he is using an existing God to prove a God exists. Said, "All events are part of God's righteous plan, and thus may involve evil but they are intended by God for morally justified purposes even if one can't see it. One's function in life is to serve God." This is the "man's-limited-ability" argument. Invoking a supernatural force stops all rational argument.

Catholic,
Protestant
religions
explained

The Roman Catholic Church was derived from three sources. Its sacred history was Jewish; its dogma was Greek; its government and canon law were, at least indirectly, Roman.

Luther's Reformation rejected the Roman elements, softened the Greek elements, and strengthened the Jewish elements. Protestants rejected the Vatican as a vehicle of revelation. Truth was to be sought only from the *Bible*, which each Man could interpret as he wished.

Many did interpret *the Bible* to their interpretation, and also didn't agree on many issues. So many Protestant sects were founded. They had no central authority to reconcile their differences.

1536
Copernicus

Astronomy: After hearing a favorable lecture on Copernicus's theory of heliocentrism, papal official Nikolaus Cardinal von Schoenberg asked Copernicus to make public his theory, then accepted by some astronomers, and to send him all his evidence. Copernicus had almost finished his fuller exposition of heliocentrism, *de Revolutionibus orbium coelestium / On the Revolutions of the Celestial Spheres*, but feared the wrath of the Vatican, so he did not give Schoenberg his evidence. He continued work on his book.

1536 Christianity: William Tyndale, a priest, published an English translation of the *New Testament*.

In England, this carried the death penalty. He fled to Belgium. English **Henry 8** had him jailed there. He was convicted of heresy, publicly garroted, his corpse burned at the stake.

Anti-Semitism The *Portuguese Inquisition* began under its Catholic king; it targeted Sephardic Jews, used torture, burning, imprisonment, and theft of the victim's properties. It burnt 1,175 victims by 1794.

1502-1592 Universities founded: All Christian. Wittenberg 1502. Buenos Aires 1536. Asuncion 1537. Santo Domingo (Hispaniola, Dominican Republic) 1538. Lima 1551. Mexico City 1553. Cordoba 1573. Trinity (Dublin) 1592..

c.1536 A Law of War: Centered in the University of Salamanca, a group of Catholic theologians of natural law and of morality known as the "School of Salamanca," began to teach a school of thought originating with **Francisco de Vitoria** that expanded on **Aquinas's** concept of natural law and just war.

Criteria for a just war They developed criteria for a just war. They said war ought to be resorted to only when necessary to avert greater suffering. First try diplomacy, then a war was only if: 1. Self defense, if there is a reasonable possibility of success. If defeat is inevitable, war is unnecessary bloodshed. 2. Preventative war against a tyrant who is about to attack. 3. War to punish a guilty enemy. 4. The war must be commensurate with the evil / suffering. 5. The people must support it. 6. It must not harm innocents. This school of thought influenced **Hugo Grotius**, the Dutch father of international law. (See 1625).

International law: **Vitoria** advocated universal laws "created by the authority of the whole world," not just pacts between two states. He criticized the Spanish king for his conquests in the Americas.

He also criticized Pope **Alexander 6** for supporting the conquests in the Americas as the pope did not have temporal authority. (Later, with **Grotius** (1625) the just war concept was subsumed into concepts of international law.) Salamanca scholars also developed modern economic theories.

Problem of Suffering They saw the inflow of gold from the New World as rising the price of goods in Spain. They also studied problems of the morality of capitalism. Regarding *The Problem of Suffering*, **Vitoria** said suffering in the world was inevitable when God gave humans *free will*.

1537 Slavery: Due to **Las Casas** (ref. 1515), **Paul 3** banned slavery of Amerindians who converted, but OK'ed slavery in Rome. In the Americas, the Spanish conquistadores set up a social system of white superiority, with the white Spaniards at the top and the darker skinned natives and Negro slaves at the bottom.

1538 Geography: **Gerard Mercator** (1512-94) Flemish. His book, *Atlas*, was a seminal work in the field of cartography, offering a collection of maps and scholarly texts that revolutionized the way the world was perceived in the 16th century. It introduced an innovative projection system that allowed for more accurate representation of the spherical world on a flat surface. It printed the first map to show the Pacific Ocean.

1539 **Ignatius of Loyola's Jesuit Rules for thinking as a Catholic.** **Ignatius of Loyola** (1491-1556), a Basque, a soldier, then wanderer, then priest, at 47, founded the *Society of Jesus*, *Jesuits*. They believed in absolute obedience to the pope, the use of education to achieve their goals, and to do "conflict for God."

Ignatius wrote *Rules for Thinking within the Church* to foster the true attitude believers ought to have in the Church. A few rules:

1. Discard your opinions, obey the Church.	4. Praise religious life and virginity.
2. Praise confession, the mass, hymns, prayer.	8. Praise churches and their images
6. Venerate relics and pilgrimages.	10. Approve and praise orders of the Church.
9. Praise and defend the commandments.	
13. Believe that which appears white is black, if the hierarchy of the Church so decides.	

White is black if the pope says so. In essence, the rules tell one to eliminate all independent thought and blindly do whatever the Church says. Jesuits became the most powerful force in the regeneration of Catholicism.

Nonetheless the Church was losing authority, not to science but to Protestants, kings and princes. Science had only a small part in the Italian *Renaissance*. It looked back to the Greeks, not to science.

1539. **Religion**: **Henry 8** had Parliament order death for questioning Catholic dogma or not obeying his *Six Articles*, including belief in transubstantiation, clergy celibacy, and oral confession in the sacrament of penance.

1540 Astronomy: With **Copernicus's** permission, **Georg Joachim Rhaeticus**, German, published *Naratio prima / First Account*, the first public statement of Copernicus's 1543 heliocentrism.

1539-41 Eurasian diseases: **Hernando de Soto**, explored Florida and the American Southeast for gold.

No gold. He passed through Indian town sites, empty due to Eurasian diseases. Mexico may have lost 75% of its population. Some Caribbean islands' natives were wiped out entirely.

1541 **Calvin ruled Geneva** Theocratic Government: After various problems, **Calvin** was invited to Geneva to lead reforms in the Church, and, with the city council, established a theocracy. **Calvin**: "The law of God, which we call the moral law, must alone be the scope and rule and end of law. He preached thrift, responsibility, sobriety (invite someone for a drink? Be fined 3 sous; be drunk? 3 sous; dance? Be fined 3 sous and jailed).

Atheists killed Predestination: **Calvin** took the *Bible* literally. He kept only the sacraments of baptism and the Lord's Supper. He had a Genevan businessman burned as speculative atheist, another beheaded for being a practical atheist. **Calvin** said, "God pre-ordained for his own glory and the display of His attributes of mercy and justice, a part of the human race, without any merit of their own, to eternal salvation, and another part, in just punishment for their sin, to eternal damnation." Adam had sinned as God determined.

Original Sin **Luther: All men are full of evil** Original Sin: **Calvin** and **Luther** retained the cruel doctrine of *Original Sin*. (Some Protestant sects did not). **Luther said that** All men are full of evil, lust and inclinations from their mothers' wombs and are unable by nature to have true fear of God and true faith in God. And, this inborn sickness and hereditary sin is truly sin and condemns to Hell those who are not "born again" through Baptism and the Holy Spirit. He and **Calvin** continued the persecution of "heretics."

Problem of Evil **Calvin** addressed the *Problem of Evil*, "Who are ye, miserable men, that accuse God, and bring it because he does not adapt the greatness of his works to your meager capacity to comprehend them? As if everything must be perverse that is hidden from the flesh." (*Book 3, Ch. 23, 2-5*). Despite some opposition, **Calvin** ruled Geneva until he died. Calvinism became the American Southern Baptist Church (men rule, women obey) and grew larger than Lutheranism.

Money talks Christian dogma changed to accommodate wealthy Christians: Lending money for interest, *usury*, was a sin (since 1311 a heresy) for Christians. Thus money lending fell to the Jews, who also were usually prohibited from owning land, serving in the military, holding a public office, etc. But, with the rise of Protestantism, supported by the rich middle class, who were more likely to be lenders than borrowers, *usury* was dropped as a sin, first by the Calvinists, then by other Protestant sects, and finally by Catholics (in 1830), so *usury* became just charging excessive interest.

Professor **Mark Smith's** 2016 book *Secular Faith*, explained this hypocrisy, "As new values emerge in society, religious leaders often "update" their groups' official positions to maintain support among the rank-and-file. . . processes of change center around reinterpreting the *Bible* to permit the desired result.

Columbian Exchange America: Columbus's discovery caused the greatest addition to human knowledge ever made by one person and the largest population and crop replacement, called the Columbian Exchange. New World's animals and plants shook up science immensely. America's crops spread around the world, output increased.

Potatoes, the most important food import to Europe, grows in cold climes and feeds twice as many people per acre as any other crop. Sailors brought hundreds of new species of plants and animals to America (wheat, sugar, horses, cows, sheep, goats), plus guns, insects, diseases, micro-organisms.

Thus, there are tomatoes in Italy, hot peppers in Thailand, potatoes and corn in Europe, oranges in Florida, tobacco in Turkey, sugar, apples, rice in the US. Some seeds, germs, insects, were carried to new continents inadvertently. Today, 60% of the food stuffs in the world originated in Mexico and Peru.

1542 Religion: Pope **Paul 3** created the *Congregation of the Holy Office of the Inquisition* to oversee local Inquisitions. He named one of his 4 children, **Pier Farnese**, as *Duke of Parma* and two grandsons, 14 and 16, cardinals.

1543 **Helio-centrism** **helios, Greek for Sun.** Astronomy: **Copernicus** (ref. 1510, '36, '40) Only when he was dying, he allowed his student **Rheticus** to take his completed manuscript, *De revolutionibus orbium coelestium* / *Revolutions of the Heavenly Spheres* from Poland to Germany to be published. Printers in Nuremberg and Leipsig refused to print it. **Rheticus** left it with Lutheran clergyman **Andreas Osiander**. **Osiander** inserted a preface purportedly written by **Copernicus** saying heliocentrism was only a computational method and not to be taken seriously as a realistic description of the heavens. It was printed. The day he died **Copernicus** received a printed copy. It said that the

work of the Renaissance

Earth orbits the Sun, not vice versa.

(A National Science Foundation poll: 25% of American adults don't know that the Earth orbits the Sun.)

Without a telescope, **Copernicus** correctly fixed the orbits of the planets, some closer to the Sun than Earth, and some further out. Heliocentrism made scientific sense. The skies could be accurately understood and measured. This was the first great scientific work of the Renaissance.

Copernicus believed the Sun as the light giver was closer to perfection and God than the Earth. He erred saying the planets' orbits were circular (close, but elliptical) and that the Sun was the center of the universe. He accurately said that heliocentrism contradicted **Aristotle**, **Ptolemy**, and Christian dogma.

Heliocentrism, most importantly, took the Earth from the center of the universe and undercut the Church's claim that God focused on the Earth. **Copernicus** dedicated his book to Pope **Paul 3**.

He said there was a divine design in placing the Sun at the center of the universe. Said, "If any mathematicians should dare, upon the authority of some passage of scripture to condemn and censure my hypothesis, I value them not and scorn their inconsiderate judgment."

Luther criticized Copernicus

Protestant fear of heliocentrism: **Luther** said, "This fool wishes to reverse the entire science of astronomy, but sacred Scripture tells us that **Joshua** commanded the Sun to stand still, and not the Earth." *James 1:11* said, "For the sun is no longer risen , , , , " **Calvin**, citing *Psalms*, said, "Who will venture to place the authority of **Copernicus** over that of the Holy Spirit?"

- 1543 Possibly due to **Osiander's** groveling preface and **Copernicus's** difficult writing style, the Vatican didn't immediately react to *Revolutions*. Similarly, there was little reaction in popular or "scientific" circles. Severe Catholic reaction to heliocentrism came only after **Kepler** (1609) and **Galileo** made it widely known in the 1600s. *Revolutions* was put on the *Index* in 1615.

Copernicus used concepts identical to Muslim astronomers's. He credited Muslim astronomers **al-Bitruji**, **al-Battani**, **Thabit ibn Qurra**, **al-Zarqali**, and **Averroes**. He had also read **Philolaus** (c.400 BC), **Cicero**, **Pythagoras**, **Heraclides**, **Plutarch**, **Aristarchus** (270 BC), and **Seleucus** (146 BC). Heliocentrism was a threat to the entire Christian view of cosmology, theology, and morality.

Einstein later said, "**Copernicus** helped bring about a decisive change in man's attitude toward the cosmos. Once it was recognized that the Earth was not the center of the world, but only one of the smaller planets, the illusions of the central significance of humans became untenable."

Theology: **Philip Melanchthon**, the first theologian of the Protestant reform. He reconciled the Bible's creation contradictions. Said that the universe was created mysteriously both in an instant and in six days.

- 1543 Anatomy: **Andreas Vesalius** (1514-64), Belgian, at 28, professor of surgery and anatomy at Padua, a week after **Copernicus's** book, published his 600 page *De Humani Corporis Fabrica* / On the Structure of the Human Body based on his dissections of corpses, a complete, accurate description of the human anatomy, with hundreds of precise illustrations, many drawn by students of **Titian**. He said that the only way to learn the human body was to dissect it.

Modern Science

Vesalius corrected over 200 of **Galen's** (AD 180) errors. **Galen** had been the absolute (but inaccurate) anatomy authority for 1500 years. (**Da Vinci** (ref. 1490) had drawn accurate pictures of the human anatomy, but they had not been made public.) His book and **Copernicus's** *Revolutionibus* are considered to mark the beginning of modern science.

Luther: Jews are poisonous worms. Burn their homes, enslave them He was the most vicious anti-Semite of all time.

Anti Semitism: **Luther** was a raving anti-Semite. His book, *On the Jews and Their Lies*, is filled with hatred of Jews, whom he termed "poisonous worms." Said, "The Jews are base whoring people. the most miserable people on earth." "They are full of the devil's feces."

He advised Germans to burn Jewish homes, synagogues, prayer books, and schools, to take away their homes, enslave them in farm labor camps, forbid them to teach or pray, or even to utter God's name. He said, "We are at fault for not slaying them. Jews and papists are ungodly wretches."

Luther thus deepened and perpetuated Christianity's ugly anti-Semitism. Priests told Christians grotesque and absurd falsehoods about Jews. **Luther** caused Jews to be expelled from Saxony in 1537, and in the 1540s he drove them from many German towns. In 1543, He tried unsuccessfully to get the elector to expel them from Brandenburg. (Only since the 1980s, a few Lutheran church

bodies have formally denounced and dissociated themselves from **Luther's** ugly lies about Jews.)

Luther also hated Muslims **Religion:** **Luther** said, "The kingdom of **Mohammed** is a kingdom of revenge, of wrath, and desolation." He also denied **Seneca's** first century statement that comets follow natural law, "The heathen [**Seneca**] writes that a comet may arise from natural causes; but God creates not one [comet] that does not foretell a sure calamity." Protestants were as hostile to reason as Catholics.

10,000 books **Natural Philosophy:** **Konrad von Gesner** (1516-65), Swiss, published *Bibliotheca universalis*, a catalog of 10,000 then extant books, with 3,000 authors. Most books of the time were as short as chapters of a modern book. Books were written about fish, birds, plants, and metals. His four volume *Historia Animalium* (1551-58) described all known plants and animals of the New and Old Worlds, and was the basis of modern zoology. His *De Rerum Fossilium* gave rise to the new science of paleontology (study of fossils).

Catholic fear of dissent: In France, the *Inquisition* closed presses of Protestant books. **Etienne Dolet**, a printer accused of printing heretical works & atheism was strangled & burned. Many printers fled France.

No compromise with Protestants **Catholics lived in their own ancient world** 1545-63 Council of Trent / Trento: (Italy) The Reformation destroyed the HRE. Kings and princes seeking to avoid Vatican taxes but still wishing to appear as good Christians to their subjects joined Protestant faiths and claimed a divine right to govern without the blessing of the pope. The papal legates criticized those who used reason to confirm their opinions rather than Scripture. The *Council* forbade interpreting the *Bible* contrary to the early Church fathers' interpretations. The Church made some efforts to reform known as the Counter-Reformation (to be run by the Jesuits), but the 18 year *Council*, stacked with Italians and Spaniards, foolishly rejected all compromise with Protestants. It denounced every doctrine proposed by the Protestants. It ordered **Machiavelli's** works destroyed. The *Council* reaffirmed that faith alone was not enough for salvation. It reaffirmed the 7 sacraments. It condemned the sale of Church offices, the sale of indulgences, & bishops' corrupt pursuits. It defined Catholic doctrines in detail and said disbelief in even one sacrament made one anathema / cursed.

Catholic reforms The *Council* limited the number of parishes a priest could have. Priests had to pass an exam to be ordained. Bishops were required to live in their dioceses. Marriage was made a sacrament. Attendance at Mass was made obligatory and declared the only proper liturgical service.

Jesuits told to found schools The *Council* told the Jesuits to establish eight universities in German speaking areas & more in England, Italy, and France. Math, scripture, cosmology (but not heliocentrism), rhetoric, good manners, and geography were to be taught. Jesuit professors were repeatedly warned not to teach atomist physics. By 1564, when **Ignatius** died, Jesuits operated 74 schools on three continents, including teaching humanist ideas. The *Council* condemned **Erasmus** as a heretic. *In Praise of Folly* was later put on the *Index*.

Unbaptized infants must burn in hell Original Sin: The *Council* reaffirmed that infants who died unbaptized go to Hell, deemed celibacy and virginity superior to marriage, ordered seminaries established in every diocese (a bishop's jurisdiction). Art and architecture were ordered to become more theatrical to appeal to and teach the scriptures to the illiterate peasants. The *Council* also ordered all music to be more holy.

Christian ignorance: Dominican **Giovanni Tolsani** denounced heliocentrism and defended the absolute truth of Scripture. Protestant theologian **John Owen** said heliocentrism "was built on fallible phenomena, and advanced by many arbitrary presumptions against evident testimonies of Scripture."

1546 Geography: **Gerardus Mercator** (ref. 1538, 1512-94), a Flemish geographer, stated the Earth had a magnetic pole. (In 1568, he devised a cylindrical projection for maps.)

Luther: Reason is the enemy of faith. He was right. Luther feared reason: Said, "Faith is direct to God. . . Faith must trample underfoot all reason, sense, and understanding. . . Reason, the Devil's harlot. . . Reason is the greatest enemy that faith has, treating with contempt all that emanates from God. Whoever wants to be a Christian should tear the eyes out of his reason. . . Raising the issue of God's existence reveals Man's sinful state. Man, not God, needs to be justified..Only faith has the assurance that God will use the evil in the world for his own ends..Reason is God's worst enemy. . . Reason must be destroyed."

1547 Henry 8 died. His son **Edward**, from wife 3 **Jane Seymour**, at age nine, ruled for six years and died of TB. Then **Henry's** Catholic daughter **Mary** by **Catherine 1**, ruled five years until she died in

1558. **Mary** burned at the stake over 300 Protestants, including **Cranmer**, becoming “**Bloody Mary**”.

Then **Boleyn’s** daughter, **Elizabeth 1**, became queen, was brutal to Catholics, ruled 45 years, and under her the Christian Church in England evolved into the Anglican Church, its dogma close to Catholicism. She made Anglicism a state church she controlled. Missing Anglican mass was illegal.

1553 **Heresy: Michael Servetus** (1511-53), Spanish physician, discovered the pulmonary circulation of blood, The *Spanish Inquisition* condemned him as he didn’t believe in the Trinity. He fled to Geneva. **Calvin**, the “Protestant pope” ruler of Geneva, said behead him. The city council only burned him at the stake.

Theology: Peter Martyr Vermigli (1499-1562) On the Biblical creation contradictions, said “So important is it to understand the creation that the Church take it as its starting point . . . The Westminster divines said it was necessary to believe all things visible were created not only out of nothing but in exactly six days.

1555 *The Peace of Augsburg* treaty between Catholics and Lutheran princes legally accepted Lutheranism. **Stupid religious wars** Princes were allowed to choose the religion for their domain (*cuius regio, eius religio*). Catholic vs. Protestant war went on. While the crusades had been mainly religious, in the religious wars, the secular and church forces were in balance. The object sought was political power.

Pascal in 1654 said, “Can anything be stupider than a person has a right to kill me because he lives on the other side of the river and his king quarrels with mine, though I have not quarreled with him.”

Blood circulates Anatomy: Matteo Colombo, Italian surgeon, showed the circulation of blood from heart to lungs and back. **Pierre Belon** described the similarities of the bone structure of all vertebrates, from birds to fish to man.

1556-1605 Hinduism, Islam: Muslim & Hindu cultures began to blend under **Akbar** (1542-1605), king of Hindustan.

1559 Philosophy, skepticism: Henri Etienne, the Printer of Geneva, published his Latin translation of the works of skeptic **Sextus Empiricus** (ref. cAD 200). It was influential, especially to **Montaigne** (1580).

1559 Catholic fear of thinking, *The Index*: Bishops in Holland 1529, Venice 1543, and Paris 1551 had banned books. Pope **Paul 4** created the *Index Librorum Prohibitorum / Index of Prohibited Writings* (“*the Index*”) which declared it a sin to print, publish, translate, sell, possess, read, or even discuss the writings on the pope’s *Index*. (See p. 416). This was to “to protect the faith and morals” of Catholics.” **Index: It’s a sin to read or discuss writings on the Index** For Catholics, this banned 3/4 of the books printed in Europe. The Vatican put **Machiavelli’s** 1532 *The Prince / Il Principe* on the *Index*. Starting in 1571, permission was required to print a book anywhere in Catholic lands. Exceptions were sometimes made for medical books. So Protestants printed the banned books. (French philosopher **Claud-Adrien Helvetius** later said, “To prohibit the reading of certain books is to declare the inhabitants either fools or slaves.”)

1560 Catholic fear of thinking: Giambattista della Porta established the first scientific society, *Academia Secretorum Naturae / The Academy of the Mysteries of Nature* in Naples. Prospective members had to present a new fact in natural science. Pope **Gregory 13** closed it in 1578 under “suspicion of sorcery.”

The Goa Inquisition targeted Jews and Hindus.

In 1562, in Guatemala, Bishop **Diego de Landa** burnt most of the books of Mayan culture as heretical.

John Knox Male superiority: John Knox (1514-’72) led the *Scottish Reformation*. He established Presbyterianism in Scotland. It was stern, austere, harsh. He said, “Nature doth paint [women] to be weak, frail, impatient, feeble, and foolish, lacking the spirit of counsel.”

1563 Religion: Johann Weyer, (1515-88), Dutch physician, was among the first to criticize the trials and persecution of persons accused of witchcraft, said evidence from torture was useless. His influential work was *On the Illusions of the Demons and on Spells and Poisons*. **Martin Luther** and the *Bible* believed in witches,”

Sea trade, slavery: In the century after **Columbus**, Atlantic sea trade exploded, spread the ideas of the *Renaissance*. Bulk trade in slaves, sugar, rum, cloth, as well as luxuries, took over the Atlantic and spurred Europe’s economy to change from agrarian to commercial. **Sea trade**

Spain and Portugal sent conquistadores to South and Central America. Dutch, English, and French sailed to North America. Slaves were needed for the Caribbean sugar plantations. Slaves in Europe were domestic servants. (Sugar plantations in Cyprus and Crete had field slaves.)

1565 Slavery in the Americas: From 1619 to 1808, about 400,000, under 4% of the African slaves brought to the Americas came to North America. About 9,600,000 were taken to Brazil

Slavery (the most), Caribbean islands, or Spanish Central America. In the Caribbean, slaves' infant mortality reached 75%. After 1620, tobacco (from the native Amerindians) became a profitable crop for American, Spanish and Portuguese settlements.

Don **Pedro Menendez de Aviles**, Spanish, founded St. Augustine, Florida, as a Spanish settlement. Slaves were among his crew. Free Africans lived in the French settlement at Fort Caroline, a few miles north. In the 16th and 17th centuries, many slaves escaped from the U.S. and were given refuge in Spanish Florida. (The US acquired Florida in 1819 by a treaty with Spain).

1569 Economics, mercantilism: Spaniard **Tomas de Mercado** said that for a state to prosper, it must sell more than it buys, ignoring the laws of supply and demand. European states then hoarded gold, limited imports and overseas investments, except for imperial ventures, regulated prices. Competition for markets caused wars and economic inefficiencies which inhibited economic growth.

1569 Anti-Semitism: **Pius 4** ordered all Jews out of the Papal States in three months, except Rome & Ancona.

1570 Geography: **Abraham Ortelius** (1527-98), Antwerp, printed the first modern atlas of 53 excellent maps.

Killing Huguenots 1572 Religion, The St. Bartholomew's Day Massacre: French child King **Charles 9**, Catholic, age 12, obeying his mother, **Catherine de Medici**, ordered killing about 100 Calvinists / Presbyterians, nobles who lived in apartments in the royal palace, as did Catholic noble families. She sought to stop Protestant influence in France. Catholics throughout France began to kill Protestants.

In 40 days, French Catholics slaughtered c50,000 non-Catholics. Pope Gregory 13 was so pleased that he ordered a gold medal inscribed "Slaughter of the Huguenots" and asked the painter Vasari to paint the scene of the slaughter on the walls of the Vatican to celebrate the killings of the "perfidious race."

This slaughter was a crucial turning point in the relations between Catholics and Protestants. It caused Protestants to no longer view the Catholic Church as misguided but as a force of evil itself. Throughout Europe, Protestant princes seized the Church's estates, sought to seize the universities.

Voltaire: "Fanaticism's most detestable example is those bourgeois who on St. Bartholomew's night ran to assassinate, butcher, and chop to pieces those of their fellow citizens who did not attend Mass."
- Across Europe, Catholic and Protestant armies slaughtered each other. All peoples suffered

Tycho Brahe 1572 Physics, Astronomy: Danish king **Frederick 2** had given Hven, an island between Denmark and Sweden to astronomer **Tycho Brahe** (1546-1601). **Brahe** had no telescope (not invented until 1609). He built large instruments to accurately study and record the positions of the stars.

He still believed **Ptolemy's** Earth-centered universe. He saw a new star in the constellation of Cassiopeia. (It was a supernova, a star exploding due to the collapse and rebound of a high mass star after nuclear fusion had depleted in its nuclear core. Supernovas were not identified until the 20th century.

1573 **Brahe** wrote that this new star showed that the universe did change. It made him famous, and, to the Church, dangerous. The new star contradicted the Church's teaching that a changeless universe showed God's immutable love for the world. Catholic clergy said he erred, blamed the Devil, said that above the Moon, the heavens did not change.

Spanish colonialism. The Spanish never learned of the abandoned city of Machu Picchu. Under Spanish rule, in 50 years, Peru fell from c.12M people to c.500,000, from diseases of the Spaniards and from being worked to death in silver mines. Peru's silver mines supplied Europe most of its bullion for 300 years. The **Inca's** writing, called *kipu* /quipu, consisted of varying length strings with varying types of knots, tied to a larger string. It has not been deciphered.

Machu Picchu

1576 Political Theory, the concept of state sovereignty: The political units in Europe were essentially family conquered lands. Nations as we now know them did not exist.

Les Six Livres de la Republique - **Jean Bodin** (1530-96), a French political philosopher, member of the Parlement of Paris, was successively a friar, lawyer, professor of law in Toulouse, and unsuccessful politician. This was during the aftermath of the Protestant Reformation and the religious conflict

in France. He was a Catholic but criticized papal authority over states. He published his best known work, his theory of sovereignty, *Les Six livres de la République /The Six Books on the State*,

A state's job is to protect private property

Bodin's aim was to construct a general theory of the state. He collected data from numerous countries. He defined sovereignty: "*la puissance absolue et perpetuelle d'une République*" / *the Absolute and Perpetual Power of a State*. (He was the first to use the word sovereignty.)

His main idea about sovereignty was "The sovereign Prince is accountable only to God." He said, "Sovereignty is supreme power over. . . its subjects, unrestrained by laws, absolute and unqualified." This was the first systematic concept of state sovereignty. Sovereignty was the essential attribute of the state. It asserted that rulers rule by divine right. (1 Peter 2:17). So the king's rule must be absolute, except not to interfere with a man's family or take a his property without just cause.

He said, kings are ethically, but not legally, limited by divine law or the laws of nature. The power of government rests with aristocrats in an aristocracy and with the king in a monarchy.

Bodin disfavored democracy. He believed that the a warm climate favors intelligent but lazy politically passive people, and is usually governed by a despot.

Social Contract

Political Theory, Social contract: **Johannes Althusius** (1557-1638) German French jurist, political philosopher, a monarchomach (anti-monarchs) said that sovereignty rested with the people, and that governments resulted from a tacit contract between a ruler and the ruled to escape the anarchy of a state of nature. **Hobbes** (1651), **Locke** (1689), and **Rousseau** (1754), all adopted this social contract idea. It contradicted **Bodin**.

The "social contract" has no historical basis

Political Theory, victors rule: Protestant theorists advocated a popular government, or at least an elected monarchy. **Bodin** said the state originated when one person or a group conquered people, not by a contract or by **Aristotle's** concept that leadership came from preeminent wisdom or virtue. (**David Hume** (ref 1739) later also debunked the idea of a social contract, said there was no evidence that any state was ever actually formed by a social contract.) The social contract theory was a popular but imaginary concept for the legitimacy of government without reference to God. The closest example of an actual social contract was the Puritan's strict 1620 *Mayflower Compact*.

Bodin was a realist, not an idealist. He realized that men fiercely protect their property. He became one of the founders of a group known as the *politiques*, who ultimately succeeded in 1598 in ending the "Wars of Religion" under King **Henry 4**, with the *Edict of Nantes*.

1576 Catholic fear of dissent: **Giordano Bruno** (c.1548-1600), Dominican monk, secretly read **Erasmus** (1511). He was accused of heresy as he accepted **Copernicus's** heliocentrism.

Bruno He argued that the Scriptures were for moral guidance, not to teach about physical things. He wrote theses promoting an extreme form of pantheism. He taught at Paris, London, and Cambridge. As a fugitive in Geneva, he criticized a Calvinist professor. (More **Bruno** 1591,1600)

1577 Astronomy: **Brahe** (ref. 1572, had seen a supernova), noted that a comet seen across Europe had passed through where **Aristotle's** celestial spheres were supposed to be, i.e., beyond the Moon. He thus concluded that the planets moved freely in space, not on rigid transparent spheres. He kept accurate records. He also corrected all existing inaccurate astronomical records. His data provided the best proof for heliocentrism, but he still thought the Sun orbited the Earth. When a new Danish king didn't support him, **Brahe** became Imperial Mathematician to the imperial court of Bohemia in Prague with **Johannes Kepler**, a German assistant. (See 1609)

1577-80 Exploration: **Francis Drake**, a successful English pirate, hated Catholics (his parents had suffered under **Bloody Mary**), was the second to sail around the world, 60 years after **Magellan's** surviving crew. He ruthlessly looted Spanish and Portuguese ships and ports. He was knighted. His logs were a state secret.

1579 Religion: **Matthew Hamont**, Brit, denied the divinity of **Jesus**. So Anglicans burned him at the stake. Due to **Erasmus** and other critics, the Church became an object of disdain if not ridicule for many elites. Importantly for science, **Aristotle's** notion that natural events occurred for a purpose was discarded .

1579 Political Theory, democracy: **George Buchanan**, a leading Scot humanist, published *The Law of Government Among the Scots*, "Power belongs to the people. When the ruler acts against the people, they have the right and duty to resist and kill him." (**Locke** in 1690 agreed.)

1580 Humanism: **Michel Eyquem Seigneur de Montaigne** (1533-92), inherited a fortune at 30, enabled him to study and read, was mayor of Bordeaux, He wrote *Essais*, the first book to reveal frankly the author's mind and heart on widely different subjects *Essais* established the essay as a literary form. It established essays as a new genre of literature that became most important in later centuries. He was a sceptic, not of religion, but of the pretensions of of reason and of dogmatic philosophers and theologians. He said, "The plague of man is boasting of his knowledge".

**Montaigne
Essais**

In studying himself, he studied humans, said humans were not superior to beasts. His essays, published from 1580-95, dealt with many of his adventures and emotions.

Of the wars of religion, he said, Men, In trying to make themselves angels, transform themselves into beasts." And, "Fame and tranquility can never be bedfellows."

His motto was, "Que sais-je? What do I know?," a starkly anti-religious view. He wanted people to know the limits of their intellect.

**Montaigne
Quotes**

"Men are blind to the brutalities of their homeland while seeing clearly the brutalities of other cultures." [We are fierce; they are terrorists.]. "The thing I fear most is fear." "My trade and my art is living." "Man is certainly crazy. He could not make a mite yet he makes gods by the dozen. Nothing is so firmly believed as that which we know least, nor [are] there any persons so sure of themselves as those who tell us fables, such as alchemists, quacks, and [theologians]."

**Simple men
make good
Christians**

"See and say yourself as you really are." "Science without conscience is but the death of the soul." "Men of simple understanding, little inquisitive and little instructed, make good Christians." "Learned we may be with another man's learning: we can only be wise with wisdom of our own."

"How many things which served us yesterday as articles of faith, are fables for us today."

**Montaigne
Quotes.
We practice
the religion of
the country
where we live.**

His *The Defense of Raymond Seybond* (c.1575) laid out his beliefs regarding Catholicism. "Sense experience and reason tell us nothing of God, so we should simply believe. "We have a religion because we happen to have been born in a country where it was in practice. If we lived someplace else, we would believe other things." Said religion was simply something taught to children. He cited Lucretius's 58 BC atheistic *On the Nature of Things* more than any other text. It was widely read during the *Enlightenment*. Cicero's skeptical *On the Nature of the Gods* was second most quoted.

**Montaigne
Quotes**

"Laws. . . are often made by fools; more often by men who in hatred of equality want of equity; but ever by men who are vain and irresolute. There is nothing more grossly and largely offensive, nor so ordinarily wrongful as the laws." His writings were put on the *Index* (1559).

Ralph Waldo Emerson (1836) said **Montaigne** was "the perfect representative of skepticism "

**1581
Galileo,
Father of
modern
science**

Natural Philosophy / science: **Galileo Galilei** (1564-1642), born in Florence, who was to become the leading mathematical physicist of his time, saw that the natural philosophy of the time was a kind of abstract philosophizing. For example, **Aristotle** had said that objects fell in order to reach their "proper place," a moral judgment.

At 17, as a medical student at Pisa, **Galileo** saw that pendulums of the same length had the same period no matter how far they swung. Scholastics, admirers of **Aristotle**, ran Pisa.

At 19, he discovered that the period of a pendulum was solely proportional to the square root of its length. (A one meter pendulum takes about two seconds.) He saw this was important for physics experiments.

At 22, He invented a hydrostatic balance, a precise scale. (next **Galileo** 1589).

1582 The **Gregorian** calendar based on **Copernicus's** findings quietly replaced the **Julian** calendar.

1583-85 Science: **Simon Stevin** (1548-1620), Flemish, discovered the *hydrostatic (water) principle*, that pressure of liquid in an open vessel depends only on the height of the liquid above the liquid's outlet. In 1685, he introduced decimal fractions to the West (used in Hindustan since the 7th century). **Stevin**

also invented a land yacht, a wagon with sails, and tripled the efficiency of windmills pumping water.

c.1584 Marlowe Heresy: Christopher Marlowe (1564-93), In *The Jew of Malta*, wrote, "I count religion but a childish toy, and hold there is no sin but ignorance." He wrote *The Tragical History of Dr. Faustus* (make a deal with the Devil. (The Devil gives Faustus 24 years of magical powers for his soul. At 24 years, the Devil takes Faustus). (**Johann von Goethe** centuries later wrote the same theme.)

no sin but ignorance 1589 Religious Justice: Dietrich Flade, (1534-1589) Rector of the U. of Treves, Germany, and Chief Judge of the Electoral Court, doubted the outlandish confessions of tortured accused witches, so he freed some. He was accused of witchcraft. Under torture, he "confessed." He was strangled and burnt.

1589-1613 **William Shakespeare** (1564-1616) world's premier dramatist, possible pen name of several worthies, the first great secularist, the poet of middle class values, criticized religion, undermined the heroic, had no personal dogma or ethics, respected but not world-renowned until the 1800s. His tragedies were family tragedies. He moulded the thought patterns, moral values and human relationships of the modern world. Men and woman were the focus of his plays, not the Medieval world they lived in.

Shakespeare enriched the English language. His works have been translated into every major language in the world. He summarized human emotions in simple profound verse, told great stories. He coined c.1800 words. He turned a phrase:

He coined over 1000 words. "Salad days.. What a piece of work is Man, how noble in reason!.. star-crossed lovers. . . He did her wrong .It's Greek to me. . .Talkers are no doers. . . quiet as a lamb. . . naked truth. . . a plague on both your houses.. what fools these mortals be. . . small beer. . .the wish is father to the thought act more in sorrow than in anger. . . fool's paradise. . .played fast and loose. . . budge an inch. . . sink or swim. . . let me tell the world. The devil can cite scripture for his purpose. ..what the dickens. ..as cold as any stone. . . the lady doth protest too much. . .the better part of valor is discretion. . .God save the king . .It is a wise father that knows his own child. the long and short of it. . . eaten me out of house and home. ..Uneasy lies the head that wears a crown .. we few, we happy few, we band of brothers. . .the most unkindest cut of all. . . a motley fool. . .forever and a day. . . not a mouse stirring. . . brevity is the soul of wit . . . the play's the thing. . O! woe is me. ..men are men. . . nothing will come of nothing. . . prince of darkness.. . every inch a king.. . fortune's fool. We have seen better days. The moon is down. double, double, toil and trouble ..What's in a name? . . Shall I compare thee to a summer's day?. . .What's past is prologue. . . lily-livered boy. . have not slept one wink . . brave new world. . . keep a good tongue in your head.. .white as driven snow . .death by inches. . . a charmed life. . . the game is up. . . To thine own self be true. . . there is nothing either good or bad but thinking makes it so. the winter of our discontent. . . .It's a bawdy planet. . . All the world's a stage, and all the men and women merely players. . . And yet words are no deeds."

1589-92 **Galileo** Science, physics: At 25, **Galileo** (ref. 1581) became chairman of mathematics at Pisa. During this period, he studied **Copernicus**. He ridiculed Scholastics, students who dressed in togas "like little wax **Aristotles**." At 26, **Galileo** wrote *De Motu antiquiora / On the older forms of Motion*, which refuted **Aristotle** who had the idea of two kinds of motion, forced and natural. **Galileo** showed they were the same. He did not publish *De Motu*. He said that a body in motion would continue in a straight line until something affected it. This is inertia, but he only applied it to horizontal motion. (**Mo-tzu**, (450 BC had first proposed the concept of inertia. **Philoponus** (ref. 549) had the idea of *impetus*, a step forward. In 1331, **Ockham** rejected **Aristotle's** and **Aquinas's** concept of a "prime mover" who keeps things going and reintroduced the concept of *impetus*. In 1687 **Newton** made *inertia* his *1st Law of motion*).

Galileo in Padua In 1592, at 28, at the invitation of the elders of Venice, **Galileo** moved to the Univ. of Padua under the protection of Venice, not the Vatican. Venice tolerated no interference from the pope. Venice had expelled Jesuits for interfering with its university. It became a great town of doubt.

Galileo in Padua taught geometry, mechanics, and astronomy until 1610. He described problems in raising weights, studied the strength of materials, and showed that projectiles follow a parabolic path. (**Aristotle** had said projectiles follow two straight paths.)

Galileo **Galileo** also described experiments showing that all objects, heavy or light, fell and accelerated at a constant and identical rate [c.32 feet/sec/sec on Earth]. (**Philoponus**, **Giovanni Benedetti**, Italian (1572), and **Simon Stevin** (1586), all had said the same (**Aristotle** had said heavy objects fell faster.) (ref. **Newton's Second law of Motion**).

In 1593, **Galileo** invented a horse-driven pump to pump water out of a mine. The

horses lived in the mines. Their food was lowered on a pulley. Their waste was pulled up. In 1596, he invented a primitive thermometer using the expansion of air. It was imperfect as it didn't compensate for outside air pressure. (more **Galileo** 1600, '05, '09-16, '24, '32-33, '38)

Earth may not be the center of the universe. 1591 Astronomy: **Giordano Bruno** (ref. 1576), 48 years after **Copernicus's** heliocentrism, wrote *On the Infinite Universe and Worlds*. It said the Earth may not be the center of the universe, "There is in the universe neither center nor circumference." "I hold that there is an infinite universe, which is the effect of the Infinite Divine Power, because I esteem it to be unworthy of the Divine Goodness and Power that, being able to produce another world, and an infinite number of others besides this world, it should produce one finite world.

Truth does not change because it is, or is not, believed by most of the people."

So he was tortured and burnt at the stake. He was excommunicated twice, hounded to Switzerland, then to France, England, and Germany. Then he was lured to Italy where the *Holy Inquisition* imprisoned him for seven years in a cell two meters square, drove a spike through his tongue, tortured him, and refused him pen or paper.

He accepted the Chaldean idea of creation by evolution, as had the Greeks, (c.586 BC), **Johannes Eriugena** (862), and **Duns Scotus** (1290). He was tried for heresy in 1593. In 1599, he sealed his fate when he refused to recant. (See 1600).

Francis Bacon, not a scientist, advanced science. But didn't appreciate mathematics 1592 Science: **Francis Bacon / Lord Verulam** (1561-1626) (ref. 1486, 1500, '16, '32-33), First Viscount St. Alban, MP at 23, Attorney General, Lord Chancellor, not a scientist but a principal founder of modern science as an advocate of empiricism and of *Induction* to gain basic facts about the world. Unfortunately he did not recognize the importance of mathematics. He taught at Cambridge and Oxford, where only Anglican clergy could teach. He offered an inspiring and comprehensive vision of future progress based on science, technology, and industry. Science among Christians was then based on **Aristotle** (who had incorrectly said that all species and the heavens were fixed by God for all time).

Bacon said, "I have taken all knowledge to be my province." He argued that the universe was a problem to be solved and thought about. For him, science's validity was its usefulness.

He caused England to accept science. Cambridge and almost all scientists at the time simply believed anything **Aristotle** or the Church said. **Bacon** taught using measurement and controls in scientific experiments. (more **Bacon** 1597, 1605, '20, '24, '37)

1596 Medicine: **Li Shizen**, Chinese, described around 1,000 plants and around 1,000 animals, with 8,000 prescriptions based on them, and a smallpox vaccine. The Chinese, practical, had no personal omnipotent god as the source of power in the cosmos. Unfortunately for China, it did not experience a scientific revolution like the West.

1597 Physics, Optics: The first "modern" microscopes were made, building on **Ibn al-Haytham's Optics**, now credited to eyeglass makers in Holland, **Hans Lippershey** and **Sacharias / Zacharias Jansen**

1597 Epistemology: **Francis Bacon's** (ref 1592) *Meditationes Sacrae* said, "*ipsa scientia potestas est*" / "Knowledge is itself power," referring specifically only to God's power. See "Knowledge is power" in the Index for a history of this well known phrase. (more **Bacon** 1605, '20, '24, '37, '84)

1598 Trying to end the Catholic/Protestant massacres, French King **Henry 4** issued the *Edict of Nantes*. It let Protestants practice their religions, but not attend French (Catholic) universities

Sugar interests ruled Parliament Sugar: Sugar was known in Europe, but not common. Muslims brought it from Morocco to Spain. Catholic Spain took it to the Caribbean to grow it. The taste of sugar took over the world. Sugar became the largest industry in the world. Sugar plantations needed workers. Solution? Slaves from Africa. **Linda Colley's** book, *Captives* says Muslims enslaved perhaps 1.5 million in North Africa between 1530-1780. Sugar interests came to control Parliament.

1600-60 *Intellectual Giants, Cervantes Galileo Kepler Bacon Descartes*

17th
Century.
Whitehead:
a century
of genius

Overview: By 1600. Protestant religions dominated most of northern Europe. A century of intense intellectual activity, progress, and the advent of doubt. In the West, science became the most distinctive human activity **Milton, Shakespeare, Rembrandt, Bach, Cervantes, Kepler, Galileo, Hobbes, Huygens, Moliere, Newton, Leibniz, Spinoza, Bacon, Locke, and Descartes.** **Bertrand Russell** said that **Kepler and Galileo** “waged the long fight between science and dogma. It was the beginning of the idea of progress.”

Scientific
Method.
The most
important
scientific
development
of the 19th
century.
Electricity
& dynamics
were
unknown

Order in Nature: The Med was still the center of the Western world, and Venice was the leading city, equal to Constantinople, anti-clerical, not under the stultifying influence of the Vatican. Refining the *scientific method* was the major knowledge development of the 17th century and with new developing tools of measurement, more important than any particular invention,

Science was rudimentary. Despite **Copernicus**, most people including astronomers still believed that the Sun orbited Earth and that air, water, fire and earth were the four elements. Chemistry was mostly alchemy. The only sources of mechanical energy were windmills and water wheels. Land transport was at walking or horse speed.

Water transport was rowing or sails. Diseases and epidemics were frequent.

Modern
science
emerged

Overview: Science presented to the world a revolutionary new view, that of a mechanical universe, the idea that God didn't exist. **Galileo** and **Isaac Newton** showed that phenomena obeyed natural laws. **Galileo:** “Nature is simple.” This guided scientists.

Very few
true
geniuses

Galileo wrote in Italian for Italy's literate. Most scientists, like **Newton** (c.1642-1727), wrote in Latin. The actual number of geniuses who influenced and advanced modern society through inventions or philosophical or political thinking was infinitesimal. Their audience was also small, Literacy grew, only in cities. Almost all serious scientific advances refuted some **Aristotle** error.

Elites
became
secular

Secular concepts of morality became a strong influence in European intellectual thought, although not among the masses, who continued illiterate and superstitious. Acting morally due to a belief in God was considered obedience, not morality. The center of the Western world, with new trade routes going to America, was shifting to the cities of NW Europe.

1600
De
Magnet

Physics: **William Gilbert** (1544-1603), **Elizabeth 1's** physician, published *Magneticisque Corporibus, et De Magno Magnete Tellure; Physiologia Nova (“De Magnete”) / On the Lodestone, Magnetic Bodies, and on the Great Magnet, the Earth.* He saw bookstores filled with scientifically useless works replete with false ancient ideas. *De Magnete* refuted prior writings and explained how most prior myths regarding magnetism were false. He agreed with **Copernicus's** heliocentrism.

Gilbert's
greatest
idea,
Earth is a
magnet

Gilbert's great idea was that the Earth itself is a magnet (terrestrial magnetism). He was the first to argue that the center of the Earth was iron, and he considered it important that they can be cut, each forming a new magnet with north and south poles. (**Mercator** (ref.1538) had said this in 1546) and suggested that the planets were held in their orbits by some kind of magnetism. It was the most comprehensive treatise ever written on magnetism. He experimented, like **daVinci** and **Bacon**. **Gilbert** was the first Englishman to accept and advocate *heliocentrism*, the same year Catholics burned **Bruno** at the stake for the same idea. **Galileo** praised **Gilbert**.

Gilbert was the first to distinguish between electric and magnetic attraction. He established the science of the Earth as a magnet. “Heliocentrism” was deleted from *De Magnete* when it was printed in Italy.

Catholic fear of dissent: **Bruno's** (ref. 1591) trial lasted seven years. In February 1600, the *Holy Inquisition*, **Roberto** Cardinal **Bellarmino** presiding, on the orders of Pope **Clement 8**, burnt him at the stake in the *Campo di Fiori* / Field of Flowers in Rome. He had talked about **Copernicus's** discovery of *heliocentrism*. **Bruno** said, “It is with greater fear that you pass this sentence upon me than I receive it.” **Bruno's** writings influenced **Leibniz, Spinoza, Galileo,** and many others.

The British East India Company had exclusive rights to trade in the Indian Ocean. It acquired quasi-

governmental powers sternly ruling British colonies in Asia, including most of what is now India. In 1677, the company gained the right to mint currency on behalf of the British crown.

- Skeptics, Pierre Charron, Three Truths**
1601 **Catholic fear of dissent:** **Pierre Charron** (1541-1603), a French priest, in 1594, in *Three Truths* had argued that God existed and that Catholicism was the true religion. He also published *De la sagesse*, a description of the philosophy of modern skepticism of his friend **Montaigne** who had argued that all our knowledge starts with sense and in sense all may be resolved, and that the soul in the brain is affected by one's temperament. And that Man's qualities are vanity, weakness, inconstancy, and presumption. **Montaigne** had written *On Wisdom*. It ridiculed witch trials.
- Montaigne**
Despite his loyal Catholic views, **Charron** was skeptical like **Montaigne**. *Three Truths* described **Montaigne's** cultural relativism. It was considered a compendium of atheism. It was a best seller for a century. **Charron** added his own notion that to doubt religion gives people comfort and security.
- Hamlet**
1603 **Literature:** in *The Tragicall Historie of Hamlet, Prince of Denmarke* by **Shakespeare** (ref. 1589), Hamlet was perhaps the most fascinating role in the world's greatest play. The play has superb speeches, violent action, pageantry, a midnight ghost, a play within a play, a duel, a poisoned cup, and eight tragic deaths. *Hamlet* has all the faults and virtues and complexities of everyman. *Hamlet* illustrated **Shakespeare's** greatest contributions to the making of the modern mind, his departures from the emphasis of ancient literature on fate and the morality of medieval literature on morality, Church and state-authority, faith, power.
- 1603 **Anatomy:** **Hieronymus Fabricius**, Italian, said veins, but not arteries, had one-way valves. (Arteries did not have (or need) one-way valves as the heart pumps blood thru arteries.)
- 1604 **Physics:** **Johannes Kepler** (1571-1630), his *Ad Vitellionem paralipomena, quibus astronomiae pars optica traditur* said that the brightness of light spreading from a point obeys an inverse square law. (More 1609)
- Advancement of Learning**
1605 In this primitive state of knowledge, **Francis Bacon** (ref. 1592-1612), wrote *Of the Proficience and Advancement of Learning, Divine and Human*. It said, "Knowledge grows as we observe, measure, and describe objects or natural phenomena." "We are not to imagine or guess but to discover what nature is or may be made to do." He was the earliest prominent proponent of methodological learning. "They are ill discoverers that think there is no land, when they can see nothing but sea."
- Induction infers a correct conclusion, but doesn't guarantee**
Bacon first defended knowledge itself. Then he showed how progress in each science benefitted man and how it could progress. He said *Induction* worked better than **Aristotle's** *Deduction*, as *Deduction* was based on assumptions supposedly true and logical and intuitive, but were rare, sometimes false, and not based on experiment and measurement. In *Induction* the premises *support* the conclusion, but don't ensure it. He called *Induction* his "great machine." He saw the necessity of schools and researchers.
- He divided learning into 3 categories. History (memory), poetry (imagination), and philosophy (reason). While he thought reason could show God existed, all else in theology was known only by revelation.
- Hath given hostages to fortune**
He said, "A little philosophy inclineth Man's mind to atheism, but depth in philosophy bringeth men's minds about to religion." and, "He that hath wife and children hath given hostages to fortune, for they are impediments to great enterprises."
- A true *Renaissance* man and believer, **Bacon** said, "The true and lawful end of the sciences is that human life be enriched by new discoveries and powers. The basis of his philosophy was practical. He wanted to keep philosophy apart from theology. **Bacon** praised **Democritus** for removing God & mind from the natural world. **Plato & Aristotle** had not. (**Bacon** 1620, '24,'37,'84).
- Cervantes**
1605 **Literature:** **Miguel de Cervantes Saavedra** (1547-1616), Spanish, had read **Erasmus**. He came from a *Converso* family, was a Muslim prisoner for years, then ransomed out, impoverishing his family.
- Don Quixote de la Mancha**
One of the most read novels of all time. He wrote *Don Quixote de la Mancha* to ridicule the chivalric romances of the day. It is the adventures of a man who, driven mad by reading too many chivalric romances, decides to become a knight-errant and roam the world righting wrongs.
- He thought he was the last knight of Christendom. He tilted at windmills thinking they were giants, fought a flock of sheep thinking they were the enemy, forever being tricked and cheated, seeking the impossible dream of justice in an earthly paradise. Despite his and comic misfortunes, he never lost dignity, nobility, and pathetic idealism. Accompanied by his loyal squire, Sancho Panza, he champions virtuous Lady Dulcinea, who is in reality a simple peasant girl.
- Despite his follies and comic misfortunes, Quixote never lost dignity, nobility, and pathetic idealism. Finally, crushed by a hostile world, Quixote died of a broken spirit. It's the most translated

book and one of the best loved in the world. It has over 600 characters. Quixote as the Visionary idealist and Panza, the practical realist symbolized the duality of the Spanish character.

Quixote and Sancho Panza are the best known fictional characters in literature.

Lord **Byron**: "**Cervantes** smiled [ridiculed] Spain's chivalry away." Poetry in the vernacular advanced.

1605 **Physics, astronomy**: **Galileo** lectured on a new star beyond the moon. It showed change in the heavens, heresy to the Vatican. In 1606, he invented and sold "Military Compasses," an early type of slide ruler. .

Devastation of Europe. A tale told by an idiot 1606 **Literature, Killing for God**: **Shakespeare** described the devastation of the Catholic-Protestant wars of religion in *Macbeth*, "Tomorrow and tomorrow and tomorrow, creeps in this petty pace from day to day. To the last syllable of recorded time, and all our yesterdays have lighted fools the way to dusty death. Out, out, brief candle! Life's but a walking shadow; a poor player that struts and frets his hour upon the stage and then is heard no more; it is a tale told by an idiot; full of sound and fury, signifying nothing."

1607 **America**: Englishmen founded Jamestown, Virginia. Survival was brutal. (More 1609).

Telescope invented 1608 **Physics, Optics**: **Hans Lippershey**, Dutch eyeglass maker, patented a *refracting* telescope, but other Dutchmen also claimed the invention. A *refracting* telescope has a strong concave lens (short focal length) near the eye, the ocular lens, and a weak convex lens (long focal length) at arm's length, the objective lens. (Like most telescopes) **James Burke's Connections** (1978) explained how it took 300 years to use glass lenses in a telescope: An invention may be technologically possible—and may appear necessary, as the telescope may have— but without a market the idea will not sell, and without a technical and social infrastructure to support and implement it, the invention will not survive."

Settling America 1609 **Jamestown**: (ref. 1607) Eight more ships of settlers came to Jamestown. In the winter of 1609-10, most starved to death. By 1610, 60 of the original 240 survived. Some fled to Indian villages to be fed. The survivors ate their brethren. The settlers were brutal to the Powhatan natives. Tobacco (from the Indians) became America's first cash crop.

Nation-States Social contract 1609 **Political Theory, state sovereignty**: **Johannes Althusius** (1563-1638) German, disliked kings (ref. 1576) defined state sovereignty as "the highest and most general power of administering the affairs which generally concern the safety and welfare of the soul and body of members of the state." This power was not to be absolute as it was limited by the laws of God, the laws of nature, and a social contract with the people. This of course differed greatly from **Bodin's** absolutism, although **Hobbes** in 1651 soon used the concept of a social contract as the basis of the most imposing intellectual justification of absolute state power ever presented.

1609 **Political theory, the Divine right of kings**: King **James 1** told Parliament, "Kings are justly called gods, as they exercise a manner of resemblance of divine power upon earth. . . If you consider the attributes of God, you shall see how they agree in the person of a king." **James** asserted the divine right of kings, as does the *Bible*. *1 Peter 2:17* and *Romans 13:1-7*.)

1609 **Religion**: **John Smyth** (1570-1612), Cambridge graduate, Anglican priest, led a few followers who believed in adult baptism to cleanse one from sin and spiritual regeneration. He was a founder of the Baptist church.

On Mars's motion 1609 **Astronomy**: **Johannes Kepler** (ref. 1577, 1604, '09) had inherited all of **Brahe's** detailed planetary data as well as **Brahe's** job as Imperial Mathematician to Emperor of Bohemia in Prague. In reality, he was the court astrologer, a job he preformed, secretly disdaining it. **Brahe** had assigned **Kepler** to study Mars's motion as it was so difficult. **Kepler's** study of Mars gave him the answer to all planets' orbits. He published *On the Motions of the Planet Mars*. He had no telescope. He studied a widely seen supernova.

Before **Kepler**, **Copernicus's** 1543 *heliocentrism* had few believers. The Church thought *heliocentrism* as an inconsequential hypothesis. **Kepler** put **Copernicus's** *heliocentrism* into precise mathematical formula, while discarding most of **Copernicus's** postulates. **Kepler** said, "God is praised through my work." Papal authorities, Lutherans, Calvinists, and Anglicans all had denounced *heliocentrism*.

Astronomia Nova **Kepler** had no telescope. He published *Astronomia Nova* /*The New Astronomy* describing the supernova and the first two of his three still-valid laws of planets' orbits of the Sun.

Ellipses dismayed astronomers, who believed orbits were circular. Said, "I much prefer the sharpest criticism of a single intelligent person to the thoughtless approval of the great masses."

Kepler's first two (of three) principal laws of planetary motion are: (He discovered other lesser laws.)
1. Planets orbit the Sun in elliptical orbits; (not circular but close) with the Sun as one focus of the ellipse

Laws of planetary motion	This ignores the very slight effect of the gravitational pull of the other planets, an issue that was not addressed until Newton . And 2. <u>A radius vector joining a planet orbiting the Sun sweeps out equal area in equal times.</u> (It goes faster when closer to the Sun). This was accepted with Newton's Principia 1687.
1609	Before Newton's gravity came to be known in 1687, Kepler held that some divine force of attraction held the moon in orbit around the Earth. [In <i>precise</i> fact, they orbit each other, although, as the moon is much smaller, it does most of the orbiting.] Kepler based his laws on Brahe's data (ref 1572, '77). The Protestant Consistory in Stuttgart told Kepler "not to throw Christ's kingdom into confusion with your silly fancies." Kepler's laws enabled persons to calculate the distance to the Sun of every planet. <u>He was the first to say that planets' orbits followed mathematical laws</u> , not divine will. He joined physics and astronomy for the first time. The Vatican put his laws on the recently established <i>Index of Prohibited Writings</i> . His mother was accused of witchcraft and threatened with torture.
1609	Kepler wrongly thought the speed of light was infinite (It's close), reasoning that in space there was no impediment. He said, "Geometry has two great treasures; one is the <i>Pythagorean Theorem</i> ; the other, <u>the division of a line into extreme and mean ratio</u> . (the relation of a line its segments when the line is so divided that the whole is to the greater segment as the greater segment is to the smaller segment. (see 1619 for Kepler's third law.)
Galileo was the first to use a telescope to examine the heavens.	Astronomy, Galileo : Based on a report of a telescope by Johannes Lippershey , but not a description, Galileo (ref. 1582, '89, 1600, '05) built a 10 power <i>refracting</i> telescope and showed it to the Venetian Senate from atop Venice's <i>Campanile</i> (bell tower). It could see merchants' ships 50 miles away (a great advantage to speculators who wanted to know what ships had made it back to Venice.) Galileo then built a 30 power telescope and saw the Moon was not smooth but had mountains and valleys. He measured the heights of the Moon's mountains by the shadows they cast.
1610	<u>Galileo was the first to observe the heavens with a telescope.</u> He saw the <i>Milky Way</i> was an immense number of stars. He saw four moons around Jupiter (so the Moon's orbit of the Earth was not unique). He saw Venus had phases like the Moon, which proved that Venus orbits the Sun, not the Earth.
Telescope released the human imagination	Galileo saw stars previously too faint to see, far more than anyone had thought of, confirming Democritus's and ibn-Biruni's c.1000 speculations. He saw sunspots. He thus made the telescope an instrument of research. <u>The telescope released the human imagination more than any other device.</u> Other astronomers, Thomas Harriot , Father Scheiner , and Johannes Fabricius also saw sunspots.
Siderus Nuncius	Galileo built and gave a telescope to Cosimo 2 , Grand Duke of Florence, who made him chief mathematician at the U. of Pisa and philosopher to Cosimo .
Jupiter has moons	Galileo published his findings regarding the Moon, Jupiter, and its four moons in <i>Sidereus Nuncius /Starry Messenger</i> (with a map of the Moon that is now in the Vatican). It astonished the world. <i>Starry</i> showed that the Earth was not the unique center of the solar system. There were other centers (Jupiter and its moons was considered a center). This didn't prove Copernicus's heliocentrism but did kill Earth's claim to be the center of the universe.
1611	<u>Galileo showed his telescope</u> to the astronomers at the Jesuit <i>Collegio Romano</i> observatory led by Christopher Clavius . His observations were confirmed by astronomers in England, France, and the <i>Collegio Romano</i> . He was made a member of the <i>Accademia dei Lincei / Lincean Academy</i> in Rome at a banquet held for that purpose.
Galileo	Contradicting Ptolemy offended Pisa's powerful philosophy faculty. Thomas Harriot (1560-1621) Brit, had also seen sunspots in 1610, published it in 1611.) Philosophy: John Donne , <i>No man is an island</i> . "Each man's death diminishes me, For I am involved in mankind. Therefore, send not to know For whom the bell tolls, It tolls for thee." Physics: In a debate, Galileo defended the Archimedean principle that bodies heavier than the water they displaced, sank, while bodies lighter floated, as against the Aristotelian (and Church) view that objects floated as they could not overcome the resistance of the water. Cardinal Barberini , later Pope Urban 8 , supported him in this debate.
King James Bible, "The Holy Bible"	Christianity: <u>Bloody warfare continued between the Protestant Union and the Catholic League.</u> To unite Anglicans, King James 1 had numerous scholars prepare the <i>Bible</i> in English, called now The <i>King James Version of The Holy Bible</i> . It was a masterpiece of literature. It was based largely on a version by Erasmus which was based on a Greek twelfth century text that had been translated by William Tyndale and John Wycliffe .

1613 Floating Bodies, Sunspots Letters	<u>Galileo published <i>Discourse on Floating Bodies</i>. It used Archimedes's principles to develop elementary hydrostatics. He privately circulated his <i>Sunspots Letters</i> which described how sunspots moved, which showed that the Sun itself rotated. [It rotates once every c.25 days.] <i>Sunspots Letters</i> also laid out Galileo's view of the principle of <i>inertia</i> (later Newton's first law of motion). <i>Sunspots Letters</i> was really about the right of a scientist to teach and defend his beliefs. Other European astronomers also saw sunspots.</u>
1614 Sunspots Letters	<u>Galileo was the most eminent scientist in Europe. He ridiculed alchemy. <i>The Lincean Academy</i> printed Galileo's Sunspots Letters. Galileo's letter to his student, Castelli, described heliocentrism, that the planets including the Earth, itself revolving, orbited the Sun. A copy reached the Vatican.</u>
	<u>Catholic fear of heliocentrism: The Church now attacked heliocentrism (and Kepler and Galileo). Pope Paul 5 saw it as an assault on the Church. It was an huge blow to the psyche of Christians. The night sky <u>appeared</u> to revolve around the Earth. This was an argument for theism.</u>
Catholics can't teach sunspots	<u>More reaction to heliocentrism: Monsignor Arturo d'Elci, overseer of the U. of Pisa, forbade astronomer Castelli to mention sunspots or any motion of the Earth to his students. Mention of sunspots was banned at Catholic universities across Europe, in Spain until the 19th century.</u>
1614	<u>More reaction: Dominican Friar Tommaso Caccini denounced heliocentrism and Galileo and even mathematics. Said, "Geometry is of the Devil. Mathematicians should be banished as authors of all heresies." Monk Paolo Antonio Foscarini tried in vain to reconcile <i>Scripture</i> with <i>heliocentrism</i>.</u>
Inquisition	<u>The Vatican attack: <i>The Holy Inquisition</i> in Rome (10 Dominican cardinals) began to investigate Galileo. Friar Niccolo Lorini told them that Galileo was a heretic. A committee of cardinals told the <i>Inquisition</i> that heliocentrism was absurd in philosophy and heretical. Galileo was called an atheist.</u>
1615 heliocentrism discredited the Church	<u>Galileo was warned: Roberto Cardinal Bellarmino (1542-1621), <u>chief Catholic theologian</u>, insisted that physical reality was explained not by reason or experience but by the <i>Scriptures</i> and the teachings of the Vatican. He said, "To admit otherwise would discredit the Church's deepest beliefs."</u>
	<u>Bellarmino was right. Most advances in scientific knowledge do discredit and replace some supernatural belief. He said, "The pope can act outside the law, above the law, and against the law."</u> <u>Bellarmino told Galileo and Foscarini to speak of <i>heliocentrism</i> only hypothetically as it was harmful to the Church. He could have used Augustine's advice not to interpret Scriptures literally, to go below the "surface" plain meaning to avoid conflicts between science and dogma, as modern Christian theologians routinely do, and, in fact, as Galileo suggested. But in vain.</u>
Religions opposed science	<u>Protestant Fear of Learning: The Protestant sects, led by Luther, were more active than the Catholics in resisting scientific knowledge. From the beginning, all shamans, witch doctors, rabbis, and holy men had said that natural events were caused by some god with an explanation supporting that priest's religion.</u>
God causes natural events	<u>God's intervention in natural events, "acts of God": The <i>Bible</i> describes instances of God causing natural events, like Noah's flood. <i>Numbers</i> 16:31-35. And, "He called down famine on the land and destroyed all their supplies of food;" <i>Psalms</i>. 105:16. "The Lord sent a great wind on the sea, and such a violent storm arose that the ship threatened to break up." <i>Jonah</i> 1:4.</u>
God causes natural events. "Acts of God?"	<u>Luther's reaction to this scientific explanation that embarrassed him was to find someone to blame. This is a common reaction by someone who is ignorant. Luther said that the Devil sent flies to vex him, that demons in clouds caused hail and thunder, and also that all sicknesses were caused by Satan.</u> <u>In 1755, Catholic clerics said the earthquake and tsunami that destroyed Lisbon was a "divine judgment." (Even 130 years later, clergy condemned Benjamin Franklin's lightning rod as an impious attempt to defeat the will of God, as "all right thinking people knew lightning was sent by God to punish impiety.") (Anesthetics were later opposed by clergy as interfering with God's plan. (to cause pain?)).</u>
1616 Longitude	<u>Navigation: King Philip 3 of Spain offered a prize for a method to determine the <i>longitude</i> of a ship out of sight of land. Galileo proposed a method based on the times of the eclipses of the moons of Jupiter, in essence using Jupiter as a cosmic clock, but it was impractical. With refinements, the method could be made to work on land. (Brits offered £20,000 for the answer a century later.)</u>
1616 Galileo	<u>Catholic fear of heliocentrism: Francisco Ingoli, a Catholic priest, wrote a letter to Galileo with over 20 arguments against heliocentrism citing the <i>Bible</i> and Tycho Brahe, who had died in 1601. <i>The Congregation of the Index</i> banned all writings that said the Earth orbited the Sun, including Kepler's Nova Astronomia and Paolo Foscarini's 1615 attempt to reconcile heliocentrism with the <i>Bible</i>.</u>

The Index also suspended **Copernicus's** *Revolutions* as a false Pythagorean doctrine contrary to Scripture "until it could be corrected." **Galileo** wrote a friend, "There is no greater hatred in world than that of ignorance for knowledge." Europe's elites disdained the Church's actions.

1618 Killing for God: The *30 Years War* began, one of the several wars of religion between Catholics & Protestants.

1619 **Kepler's third law** Physics, astronomy, planetary motion: **Kepler** (ref. 1609) published *Harmonices Mundi*, in Latin, with his third law of planetary motion, The further from the Sun, the longer the orbit. Specifically, a planet's average distance to the Sun cubed is proportional to the planet's orbit period squared. He showed that this also applied to Jupiter's moons. [Like any scientific law, it of course applies to any orbiting object. He said each planet was held in its orbit by a guiding angel. **Newton's** gravity corrected that in 1687.

1619 **Vanini, Nature** Catholic fear of dissent: **Lucilio Vanini**, an Italian priest, wrote *Dialogues Concerning Nature*, said all religions, including Christianity, were human inventions invented by clergy and kings simply for the sake of power. The Holy Inquisition cut out his tongue and burnt him at the stake.

1620 Math: **Rene Descartes** (1596-1650) French, with a Jesuit education, founded modern philosophy and was the most important philosopher since Aristotle. He discovered analytic geometry. He was in the Bavarian army for nine years. He returned to France to study and write. (more **Descartes** 1633)

1620 An English Protestant sect, the Puritans (The Pure), had found Anglicans too "popish," and had moved to Holland. Then in 1620, they sailed for Jamestown on the Mayflower. Winds blew them to Plymouth, Mass. Life was hard. 18 women were on the Mayflower. By the next Spring, only four were alive. Citing the *Bible*, the Puritans took land populated by Pequot natives.

They massacred 600 Pequots in 1637, treated their women like cattle, had slaves, and paid bounties for Indian scalps. **Will Durant**, "Generally, religion and puritanism prevail when the laws are feeble and moral codes must maintain social order."

1620 **Francis Bacon: Novum Organum** Logic, Francis)Bacon: (ref 1592, 97, 1605) issued *Novum Organum / New instrument* (**Aristotle** had used the title *Organum*.) **Bacon** introduced a new system of logic, i.e., to find the essence of heat, 1. list all situations where heat is found. 2. list similar situations except no heat. 3. list situations where heat varies. The cause of heat is that common to all in list 1, lacking in list 2, and varies in list 3. This theory did not last. **Bacon** named three discoveries that set his age apart from ancient times printing, gunpowder, & the magnetic compass. **Bacon** was likely the source for **Newton's** disdain for hypotheses.

How we think **Induction** **Bacon** drew up a program to advance science, which in eloquence and insight has not been surpassed. Like **da Vinci**, **Bacon** was a strong advocate of Induction (rather than the 100% certain but rarer *Deduction*). To answer the fact that an inductive conclusion isn't necessarily 100% sure, just an inference, he said seek a negative example to falsify the *Induction* conclusion. That will assist in validating *induction's* conclusions. (This anticipated **Popper** 1927, 33-34). **Bacon** never accepted Copernican heliocentrism and was critical of **Gilbert's** (1600) support of the daily revolution of the Earth.

Bacon said that positive confirmations and better premises strengthen inductive conclusions. To acquire knowledge, one must interpret the particulars given in sense experience.

Men have little imagination He criticized those who have "endeavored to found a science on the books of *Genesis* and *Job*." He said, "Custom (cultural conditioning) is the principal influence of man's life. Men do just as they have done before, as if they were dead engines moved only by the wheels of custom."

Silvia Sylvarum *Novum Organum* was one of the greatest exhibitions of human genius in the history of human thought. It showed the modern world the way out of the scholastic method and reverence for dogma into the experimental method and reverence for facts. **Bacon's** *Silva Sylvarum*, said, "The investigation of lower and simpler animals is more apt to reveal the secrets of life than similar studies" of more complicated creatures where such secrets may be hidden."

Bacon on evolution Long before **Darwin** or when that the actual length of geologic time and the nature of fossils were known, **Bacon** said, "The transmutation of species is, in vulgar philosophy, pronounced impossible, but the opinion of impossibility is to be rejected, and the means thereof to be found out."

Novum Organum: Idols of the mind mislead us *Novum Organum* said that humans's thinking was led astray by idolatry of four kinds:
1. *Idols of the tribe* are based on human nature itself. All perceptions depend on the individual, not on the universe. People distort the nature of things by merging their own nature with it.
2. *Idols of the mind*, the tendency to see more order and regularity in systems than truly exists, due to people following their preconceived ideas about things, derived from their experience.

3. Idols of the marketplace caused by loose language, the tyranny of words, (a book title in 1938)
4. Idols of the theater, prejudices, from philosophical or religious systems, or stage plays.

He said that science itself is not immune from tradition.

Francis Bacon Quotes

Truth is pleasurable

"There is in human nature generally more of the fool than of the wise." " Nothing is terrible except fear itself." "The genius, wit, and spirit of a nation are in its proverbs." "Knowledge and human power are synonymous." In his *Essays* (1625), "If one will begin with certainties, he shall end in doubts; but if one is content to begin with doubts he shall end in certainties. . . . No pleasure compares to standing upon the vantage-ground of truth. So be true to thyself, as thou be not false to others." "Of great riches, there is no real use except in the distribution; the rest is but conceit." He described the logical fallacy known as *selective perception*, i.e., people accept results that agree with them and ignores those that don't. **Darwin** later wrote, "I worked upon the true principles of Baconian induction."

Galileo and Bacon were the first to challenge Aristotle. Bacon, the statesman of science

Galileo and Bacon were the first to forthrightly challenge **Aristotle's** thinking that had dominated science and philosophy for c2000 years. **Bacon** trusted his senses completely, in contrast to **Descartes**, who came a few decades later. **Bacon was the first great statesman of science.** Most importantly, he taught scholars how to think. Historian **William Whewell** (1840) Brit., said **Bacon** was the most important hero of the revolution of the *scientific method*. **Bacon** died in debt at 65. He left a legacy of belief in the evidence of the senses and experiment.

Philosophy: **Alfred North Whitehead** (1912), said, "The main importance of **Francis Bacon's** influence does not lie in any peculiar theory of inductive reasoning which he happened to express, but in the revolt against second-hand information of which he was a leader."

1623 Essays on Genesis

Science: Marin Mersenne (1588-1648), French priest and Minorite friar, polymath, mathematician, and natural philosopher, published *Quaestiones celeberrimae in Genesim / Essays Commenting on Genesis*. In reality it was a polemic against then popular magical and divinatory arts like cabalism, Rosicrucianism, alchemy, angelology, astrology, astral magic, & animistic and pantheistic philosophies. *Quaestiones* advanced the development of the Scientific Method. His formula:

1. Reject all previous authority,
2. Base all results on direct observations (*empiricism*), and
3. Ground all understanding of natural phenomena in mathematics. (like **Descartes and Galileo**).

He had many scientific contacts and has been called "the center of the world of science and mathematics during the first half of the 1600s" and, because of his ability to make connections between people and ideas, "the post-box of Europe". He was also called the "father of acoustics." (More 1635)

1624 Galileo went to Rome with his theory of tides.

The Vatican vs. Protestants: The Church was in the midst of the Protestant Revolt, vying to be the authentic interpreter of the *Bible*. Cardinal **Barberini**, who in 1611 had defended **Galileo's** anti-**Aristotle** arguments re floating bodies, became pope **Urban 8**. **Galileo** went to Rome as he thought **Urban** would accept his arguments as he had better proof of heliocentrism. He based heliocentrism on his incorrect theory of tides (His major scientific mistake). **Urban** told him to discuss heliocentrism only hypothetically until he had definite proof. **Galileo** returned to Florence to put his proof in a book.

1624 Deism. De Veritate

Religion, Deism: Lord **Edward Herbert** (1583-1648), Brit, diplomat, metaphysical poet, historian, and philosopher, founded *deism*, an anti-empirical theory of knowledge. He said that the common articles of all religions apprehended by instinct, have a creator, a duty of worship and repentance, certain moral standards, and future rewards and punishment. *Deism* developed no churches or priests. He published *De Veritate / On Truth* which said "Instructed reason" is the surest guide to truth. All dogma added by churches was irrelevant.

A creator made the world and let it run

Deism is based on reason rather than revelation, emphasizing morality, but denying that the creator interferes in the natural laws of the universe. *Deism* says an impersonal deity created the universe, set moral standards, and then let it run according to natural laws he established.

It had no miracles, no virgin birth, no Trinity, *Deism* was thus a religious *philosophy* as it posited a divine creator, but not an organized religion. It said clergy were unnecessary human creations.

Deism appealed to intellectuals

1624

Deism allowed the intelligensia to ignore the contradictions of the established religions and still tell the masses that they believed in God. **Hobbes, Jefferson, Washington, Locke, Paine, Voltaire, Franklin, John Adams, Madison, Rousseau, Adam Smith, Robespierre, Victor Hugo, Ethan Allen, Mark Twain, Laplace, Saint-Hilaire, Herschel, Watt, Lamarck, Lyell, Max Planck, Mendeleev, Alexander Pope, Schiller, Napoleon, da Vinci**, and most persons of the *Enlightenment* were *deists* or heavily influenced by *deism*. *Deists* considered the *Bible* superstition.

Mill: Most of the great men in the world live as atheists

Whether those who claimed to be deists actually believed in a deity or followed **Machiavelli's** advice to simply *fake* piety for political reasons is open question. The statements by rulers quoted herein at 1532 convincingly how shows rulers hypocritically use religion to rule.

John Stuart Mill in 1876 said, "The world would be astonished if it knew how great a proportion of its brightest men, those most distinguished even in popular estimation for wisdom and virtue, are complete skeptics in religion."

(**Voltaire** said the same, "Most of the great men of this world live as if they were atheists").

So, Protestantism gave birth to religious pluralism, that gave birth to religious skepticism, that advanced the breakdown of Christianity. *Deism* never spread beyond Europe and America.

1624 **Physics: Jan van Helmont** (1580-1644), Flemish: Air is a mixture of gasses.

1625 **Grotius**, Political Theory, international law, state sovereignty: Huig de Groot / Hugo Grotius (1583-1645), from Delft, Father of International Law. His great treatise, *De Jure Belli ac Pacis / On the Law of War and Peace* (1625) was written in prison. He escaped in a chest supposedly full of books, helped by his wife and maid. **Grotius** said that a nation was sovereign when it was free from control by another state. State sovereignty was not absolute but subject to divine law, the law of nature, by international law, and by agreements between the rulers and the ruled.

On the Law of War and Peace

Killing for God: Grotius was revolted by the atrocities he saw being carried out in the then ongoing bloody and disastrous wars of religion of which "barbarous races would be ashamed." He defined "just causes" for a war, namely "self defense, reparation of injury, and punishment." He compiled the rules he felt nations ought to follow, whether or not a war was "just."

He combined custom and reason. He made the case for natural law in international relations and the "freedom of the seas." Nature was God's creation, so natural law had a theological justification. (A circular argument). He said that international law is based on four different categories, in order of importance, 1. agreement, 2. custom, 3. reason, and 4. authority.

Grotius quotes "Human positive law includes civil law, which comes from the power of the state, the law of nations, which gets its authority from the will of all or many nations, and law which does not come from the state though subject to it, such as the commands of a father or a master."

1625 **Political Theory: He developed four major principles for his laws.** 1. Nations should be judged as persons are. 2. Lawless nations should be sanctioned as persons are. 3. The laws he proposed should apply to all states. 4. He said that states should be altruistic and charitable.

Natural rights

He proposed for the first time that prisoners and conquered states should be treated with justice. He condemned killing of prisoners. He used historic examples extensively.

No poor, no women, foreigners in government

Grotius was the first to clearly define the idea of a society of states governed not by force or warfare but by actual laws and mutual agreement. Said natural law based on reason exists even without God. He also introduced the concept of natural rights of individuals. But, he said that governments should not include the poor, women, or foreigners in their public councils.

Seven Great Statesmen

Political Theory, justice: Andrew Dickson White (1896) in *Seven Great Statesmen in the Warfare of Humanity with Unreason* (1910), said of **Grotius**, "At a time when kings were absolute and cruel, **Grotius** thought out for Europe the precepts of right reason in international law. whose thoughts, reasonings, and appeals produced an environment in which became an evolution of humanity that still continues."

1628 **Will Drummond**, He who will not reason is a bigot; he who cannot is a fool; he who dares not is a slave.

Blood Biology, anatomy: Before 1600, biological science was crude. The theories of **Galen** 2nd century AD) ruled. (In 1555, **Matteo Columbo** had described blood going between the lungs and the heart.

William Harvey (1578-1657), Brit, doctor, began lecturing at the Royal College of Physicians on the circulation of blood. After years of experiments, he discovered the orderly systematic scientific principles of blood circulation. He published in Latin *Exercitatio Anatomica de Motu Cordis et Sanguinis in Animalibus / Anatomical Exercise on the Motion of the Heart and Blood in Animals*,

It is a detailed study on the circulatory system, specifically on the movement of blood and the function of the heart in living organisms. He disputed the medical theories of his time which said that blood was created in the liver and then consumed by the body.

He said that the heart was a pump, circulating blood throughout the body in a closed system. This revolutionary idea was the foundation for modern understanding of the circulatory system and cardiovascular health. Said all creatures come from eggs. His book was important to medicine.

First to use experiment to verify hypotheses

He did not discover the tiny capillaries of the arteries that transmitted the blood to the capillaries of veins to take the depleted blood back to the heart. (**Malpighi** did so in 1666.)
His greatest contribution to medicine was to introduce scientific experimental laboratory methods. He thought of hypotheses and tested them by experiment.
He was the first scientist to use experiment to solve a biological problem.

1629 Political theory, Theocracy: The Massachusetts Bay Colony was chartered by **Charles 1** as a theocracy. Women had two rights, to petition a court for her inheritance when her husband died and to protest her husband's beatings. No equality. No women's rights that today are taken for granted.

Some must be rich, some poor

1630 **John Winthrop** (1587-1649) Puritan, lawyer, wealthy, first governor of the Massachusetts Bay Colony, a real aristocrat. He said, like **Martin Luther**, "In all times some must be rich, some poor, some high and eminent in power and dignity, others, meane and in subjection."

1631 Reason: People believed that witches had sex with the devil, flew at night on broomsticks, changed into cats and hares, and ate human flesh. Jesuit **Frederick Spee** (1591-1635) German, professor, poet, after an accused witch said she had seen him turning into a wolf and do other weird things, wrote *Cautio Criminalis* and condemned the cruelty and injustice of witch hunts.

Dialogo sopra i due massimi sistemi del mondo

1632 Galileo vs. the Church; Augustine's allegorical City of God had become, due to Aquinas, the heavens, and the City of Man was the Earth. The heavens were God's promise to the faithful.

To question this immutability was unacceptable. Galileo got four imprimaturs and published *Dialogo sopra i due massimi sistemi del mondo Tolemaico, e Copernucano/ Dialogue on the Two Chief Systems of the World, the Ptolemaic and the Copernican*.

He published it in Italian to give it a wide audience. In his book, a simpleton said certain phrases that Urban 8 had said to Galileo in their private conversation. **Urban** took offense..

Galileo charged

1633 In fact, **Galileo's** proof was based on his wrong theory of tides, *not* good science.

But the merits of **Galileo's proof** were irrelevant.

The Church did not challenge **Galileo's** science, just that it contradicted Scripture. It did. **Galileo** said he saw moons around Jupiter. The Inquisitors ruled that the moons didn't exist.

Galileo on trial, convicted, suspicion of heresy

The Holy Inquisition, ten Dominican cardinals including the pope's brother and nephew tried **Galileo**. He had no lawyer or a copy of the charges against him. They convicted Galileo for "vehement suspicion of heresy" for teaching heliocentrism. The decision was based on a document (unsigned and most certainly forged) prohibiting him and only him from teaching heliocentrism any way whatsoever, even by way of discussion or speculation.

The cardinals threatened torture. He recanted.

Repeatedly threatened with torture on orders from Urban 8, Galileo recanted his belief in heliocentrism in a statement prepared by the Church. He was 70. The Church forbade him from further scientific work, put *Dialogue* on the *Index*, sentenced him for life to house arrest, and prohibited him from speaking about heliocentrism. His statement was disregarded by scientists.

The Church distributed his recantation widely. The Church decreed that scientific hypotheses could not contradict the *Scriptures* in any way. The Church continued to claim his punishment was due to his disobedience of a Church order. His real crime was embarrassing the Church. The Vatican ordered all inquisitors that no work of **Galileo**, old or new, could be printed.

Charles Van Doren explained **Bellarmino's** error. He should have read **Augustine** better to see that *City of God* and *City of Man* were allegorical to let **Galileo** be the authority for the *City of Man* and the Church for the *City of God*. **Bellarmino** wanted the Church to rule both. So it ended ruling neither.

Dialogo banned

The Church won the battle; it silenced Galileo, but of course it lost the war. **Galileo's** book was out; his recantation was considered coerced. Scientific inquiry inexorably advanced in lands beyond Vatican influence. He was the most eminent scientist in Europe. (**Bellarmino** was canonized in 1930.) **Galileo** got off light. The Catholic Church murdered **Bruno** and **Vanini** and thousands of others.

1633 Galileo at home: **Galileo** returned to his house in Florence, but did not give up his studies.

There he measured the force of attraction between objects and Earth, before gravity got its name. In spite of **Kepler's** ellipses, but like **Copernicus**, **Galileo** wrongly said planets' orbits were circular.

Relativity

Physics: **Galileo** introduced the concept of *relativity*. That is, the motion of any object is relative to a reference point. **Galileo** also suggested that all physical laws are the same regardless of one's state of motion, if one's velocity is constant.

He advanced science in four main areas, astronomy, laws of motion, use of math, and experiment.

Galileo: Science theology relationship: The conflict between Galileo and the Church was about the role of science itself. Galileo's whole being was an affront to the Church. He said, "I do not feel obligated to believe that the same God who has given us sense, reason, and intellect has intended us not to use them." He intended to use his intellect even if it conflicted with the Church's dogma. **Galileo** risked his freedom for science and the theory of another man.

He made an intellectual revolution **Galileo** said that what he could prove by experiment and math was true. He caused an intellectual revolution by proposing that physicists should discard Aristotle's essences and that the only way to find out what was happening was to observe, experiment, and measure, empiricism.

1633 In experiment, look for the nearest cause for an event (Ockham's razor), and realize that there is order in nature, that the universe could be reliably observed and should be reduced, if possible to math. He was the first modern person to understand that math can truly describe the physical world. He wrote, "The book of nature is written in mathematics." He and **Francis Bacon** revived **Pythagoras's** vision of math not for its own sake but to clarify the nature of physical relationships.

Theology: The Bible, Qur'an, and other scriptures have messages of mercy and tolerance, plus statements about the world scientifically false. The fundamentalist school of Christian theology argues that the factual errors in the Bible (purportedly inspired by God) don't really mean what they plainly say. They simply believe the Old and New Testaments are literal truth, biblical inerrancy.

No Science in Catholic Europe The Church's persecutions of Bruno, Vanini, and Galileo largely stopped scientific inquiry in Catholic Europe. So, like **Descartes**, science moved to Protestant North Europe. The Church's rigid adherence to **Ptolemy** and hostility to science in general caused educated people to see scientific inquiry as different from, and more reliable than, religious beliefs. (More **Galileo** 1638)

Background, overview: Europe was in a time of crisis with many Protestant sects, murderous religious wars, and humanism was spreading. The Muslim, Chinese, Korean Japanese, and Hindu civilizations were scarcely affected. They stagnated in relative isolation.

1633 **Descartes started modern philosophy** **Rene Descartes** (ref 1619) in 1628 moved from France to the more liberal Holland. He decided that philosophy needed a new method. This idea struck at the skepticism then current. He was dissatisfied with the lack of agreement among philosophers. He wanted to show that at least some things are absolutely true, to get rid of all the comfortable old assumptions, to take nobody's word for anything, to find something he could be sure of, as knowledge must be based on at least one indisputable fact. Unlike **Francis Bacon**, he rejected one's senses as they were unreliable. Even reason was fallible, including his own. Only thinking itself indisputable. Inexplicably, he thought all men had an equal amount of good sense.

How Descartes thought He said, "There is nothing so strange or so unbelievable that it has not been said by one philosopher or another." "I suppose therefore that all things I see are illusions; I believe that nothing has ever existed of everything my living memory tells me. I think I have no senses. I believe that body, shape, extension, motion, location are functions. What is there then that can be seen as true? Perhaps only one thing, that nothing at all is certain." He wrote but didn't publish *Traite du monde*, a book of knowledge, when he saw what the *Inquisition* did to **Galileo**. (More **Descartes** 1637)

1635 **Mersenne spread scientific knowledge** Philosophy, Science: Martin Mersenne (ref. 1623) set up an informal *Académie Parisienne*, which had nearly 140 correspondents, including astronomers and philosophers as well as mathematicians, and was the precursor of the Académie des sciences established by **Jean-Baptiste Colbert**. He hosted twice weekly secret gatherings of intellectuals in his cell at the Port-Royal monastery in Paris to discuss philosophy and science. **Descartes, Pascal, and Hobbes** attended. But most importantly for the advance of knowledge, Mersenne corresponded (in Latin) with all the leading scientific thinkers of the day, spreading their ideas to each other.

1635 Public education: The town of Boston founded Boston Latin School, first public school in America.

1636 **Harvard** Education: The Massachusetts General Court (Puritans) founded the US's first school of higher learning, Harvard College, to train Unitarian and Congregational ministers. Harvard offered a classic academic curriculum consistent with Puritan ideology. It became secular in the 19th Century. Most of the first colleges in America (Harvard, William and Mary 1693, St John's College, and Moravian Female Seminary, Yale, and Princeton) were founded for religious purposes.

1637 Discours de la methode All can be doubted except our own thoughts	Philosophy: Four years after putting <i>Traite du monde</i> aside, Descartes published anonymously, <i>Discours de la methode pour Bien Conduire sa Raison et Chercher la Verite dans les Sciences / Discourse on the Method of Rightly Conducting Reason and Seeking Truth in the Natural Philosophies (sciences)</i> in French, not in the scholar's Latin. <u>In this book, he doubted everything</u> doubtable; that is, everything that did not pass his criterion of truth, clear and distinct ideas (self-evident truths). He said, "<u>Except our own thoughts, there is nothing absolutely in our power.</u>" He was curious. His philosophic scheme was based on relentless skepticism. He gathered all the leading ideas of the 17th century. Said, "I seem to have gained nothing in trying to educate myself unless it was to discover more and more how ignorant I was. A <u>rationalist, he held the medieval view that truth requires certainty.</u> This fell when empirical science showed that scientific truths are always tentative, subject to better evidence.
A good mind isn't enough Free Will	He said, "It is not enough to have a good mind. The main thing is to use it well. He wanted to know how we know something. Said, "That our will is free is self evident." Perhaps his was. After Descartes started modern philosophy, the centrality of <i>free will</i> can be traced to two widely shared assumptions, one, that without a belief in <i>free will</i>, there would be little incentive to act morally, and two, salvation depended on God's assessment of how one exercised his <i>free will</i>.
Descartes' rules to test a theory	Descartes said, "The whole of philosophy is a tree. Its roots are metaphysics. Its trunk is physics. Its branches are the other natural philosophies. <u>To test a theory, he gave four rules,</u> 1. Only accept what you are sure of. 2. Divide any difficulties into as many issues as possible. 3. Resolve the simplest issues first. 4. Record each step thoroughly. Make your review general so all can be understood. "Methodical doubt" (systematic skepticism) could eliminate unreliable, vague and imaginary thoughts. He described how geometry influenced his thinking, "The long chain of simple and easy reasoning how experts in geometry solve their most difficult problems tells me that all things that people know, are mutually connected in the same way. <u>He created co-ordinate geometry, uniting algebra and geometry.</u>
Je pence, donc Je suis. Cartesian Dualism. He also concluded his soul existed	<u>As the mind cannot be doubted, but the body and the material world can be, they must be different,</u>" This is <u>Cartesian dualism</u> or the mind-body problem. (Anaxagoras had also separated mind from matter.) (See 1643- Elisabeth) Descartes started with the fact that he was able to think. <u>Je pense, donc Je suis; / I think, therefore I exist.</u> This has been called the most famous sentence in philosophy. As Latin didn't have separate words for mind and soul, he also concluded that the existence of our souls is as certain as the existence of our minds. From his self-evident truths, he deduced other truths back into existence by evidence. So the thinking person was at the center of his inquiry, <u>not things (Aristotle), or forms / ideas (Plato).</u> (Ambrose Bierce: later said, I think that I think; therefore I think I am.)
There are three kinds of ideas. Mind-body separation has been doubted by modern scientists 1637	Epistemology: Descartes classified ideas in three types: 1. <u>Innate ideas</u>, that originate from within, such as the idea of self, 2. <u>Adventitious ideas</u> that come through the senses, and 3. <u>Factitious ideas</u> that are made up from the elements of ideas of other things. As the physical world (one's body), was different from the mind (soul), it could be studied by reason and mathematics. (Hume a century later posited a list of different types of statements, see 1748). <i>Discourse</i> said that the body works like a machine and follows the laws of physics, whereas the mind (or soul) is immaterial and follows its own set of rules and could be studied separately (reflecting Christian belief more than reason. Descartes and Popper (1927, 33-35) say that the mind and body are separate but can affect each other (through the pineal gland). Modern scientists see no reason to think that the brain has a different set of physical laws. They are just much more difficult to discover in the brain. He said that the laws of mechanics are the same as the laws of nature so humans could understand the universe with physics and mathematics.
Cogito, ergo sum	Philosophy: Descartes was a devout Catholic. His theology was <i>Middle Ages</i>. He published, in Latin, <i>Principia philosophiae / Philosophic principles</i>, 207 of them, his replacement for Aristotle. It synthesized his 1637 book, <i>Discourse</i> and <i>Meditations</i>. He repeated his trademark motto in Latin, "<i>Cogito, ergo sum. I think, therefore I exist.</i>" This attacked the current skepticism. His book said, "A body maintains its state of motion unless a force acts on it." (In 1687, this was Newton's first law of motion)
Descartes' Ontological argument for God	Much of his <i>Principia philosophiae</i> was his <i>Argument from the Idea of God</i>, like Anselm's 1076 <i>Ontological Argument</i>, but where Anselm emphasized <i>greatness</i>, Descartes emphasized <i>perfection</i>. (There's a difference?) Specifically, he wrote, "God's existence is inferred from the fact that necessary existence is <u>contained in the clear and distinct idea of a supremely perfect being,</u>" i.e., <u>God's existence is self-evident as it is in his nature to exist.</u> As we are finite, the idea of an infinite being must have

come from such infinite being. . . only God could have caused the idea of God to arise in our minds."

Descartes derived his God from reason, not from the Bible

Descartes' God: He argued that the existence of a loving God is logically necessary for the evidence of the senses to be meaningful. **Descartes's** infinite being was not the God of the Bible. His God was derived from reason, not faith. But, "Divine authority takes precedence over all our perceptions. He said that knowledge must be based on one irrefutable fact."

Descartes showed the basic weakness of the *Argument from Religious Experience* (I saw/spoke-to God), one of the oldest arguments for a god, when he showed the unreliability of most everyday perceptions. (Many philosophers, including **David Hume**, **Thomas Hobbes**, and **A J Ayer**, also criticized the *Argument from Religious Experience* for its unreliability.)

As God is perfect, he wouldn't trick Man, So use your reason.

Philosophy: **Descartes asked**, "How is one to know what is actually true?" He reasoned that as God was perfect, He would not deceive Man, and so what one could determine what was clear and evident by reason, must be so. So, there's a distinction between *res cognitans*-subjective experience, consciousness, the interior life, which was certain - and *res extensa* -matter, physical things, the outside world, the universe. In the end, his philosophy rested on God. Despite this, the Vatican put his works on the *Index* in 1663. (He wrongly thought the speed of light was infinite.)

So Greek rationalism and empiricism were back important to human activity. This devastated traditional religious views. He made the soul a philosophical notion, not a religious one.

More than anyone, he marked the intellectual transition from the Middle Ages to the modern world. His method dealt well with the material world. His basic idea was that all truth must be capable of proof; not just what authorities said. His philosophy also undercut all prior philosophers theories.

He created the graph. His most profound mathematical finding

Math: In an appendix to *Discours*, **Descartes** described his most profound mathematical finding, that an *equation* was not the only way that mathematical terms could be related. He devised the idea of constructing co-ordinates to represent pairs of numbers relating to algebraic terms, like X and Y.

He created the graph, which turns pairs of numbers represented by X and Y into meaningful shapes, (called coordinate geometry or Cartesian geometry.) The graph ended the need for **Kepler's** cumbersome geometric drawings. It permitted any series of positions along a line to be described according to its vertical and horizontal co-ordinates, of great use studying planetary orbits.

1637

What role for the soul?

Descartes let people think without God.

An explosion of scientists: **Copernicus**, **Kepler**, **Galileo**, etc., had raised the question, If science tells all, what is left for the soul or God?" **Descartes** was the first great philosopher to address this issue. Deeply Catholic, he undermined the Church's authority more than any other person, simply as he gave a *scientific method* that revolutionized how humans could think, without God's revelations.

He was of course accused of atheism even as he had said that God was guarantor of truth.

He was also a major figure of modern *continental rationalism*, later used by **Spinoza** and **Leibniz**, as a guide to finding truth, as opposed to the *empiricist* school of **Hobbes**, **Locke** (1689), **Berkeley** and **Hume**. Rationalism and empiricism both denied Christian dogma.

Descartes believed that every event must have a reasonable cause, like **Spinoza** and **Leibniz**.

Analytic Geometry

This changed geometrical problems into algebraic problems and unified algebra and geometry into *analytic geometry*, the first big step toward today's integrated structure of mathematics. It allowed both geometry and algebra to address the same problems. It transformed mathematics and influenced the work of mathematicians and astronomers. He invented analytic geometry. By this time, geometry (with trigonometry) had become the best understood mathematical discipline. Algebra less so.

Aether pervaded space

Physics: **Descartes** also discovered that secondary rainbows were due to two internal reflections in raindrops. He wrongly thought that light traveled through *aether*, an invisible substance that filled space. He described the physical world as composed of invisible particles of matter in motion in the aether. He thought that *vortices* caused gravity, as he did not believe that a force could act through empty space.

1638

aether

Physics: **Descartes** theorized that light is a pressure wave through the second of his three types of matter that make up the universe. He invented properties of this fluid that make it possible to calculate the reflection and refraction of light. The "modern" notion of the *aether* was born. (**James Clerk Maxwell** (1861,'67) accepted the concept of *aether*. It was debunked in 1877 by **Albert Michelson** and by **J J Thomson** in 1894). All travel was still at walking or horse speed, 200 years before railways.

Philosophy: **Schopenhauer** (1819) said, "**Descartes** is rightly regarded as the father of modern philosophy primarily and generally as he helped the faculty of reason to stand on its own feet by teaching men to use their brains in place of the Bible, on one hand, and **Aristotle**, on the other." (More 1641, '43-44, '63, '71)

The Enlightenment was a struggle against superstition, prejudice, & intolerance. It questioned all the basic concepts of Christian and Jewish thinking.

The Enlightenment /Le siècle des lumieres was a cultural /intellectual movement of principally French, British, and Scottish intellectuals in the 17th and 18th centuries. It sought to use the power of reason to reform society and advance knowledge. Its defining aspect was the investigation of human nature and man's relationship to society. Its influence was far greater than the Renaissance and Reformation.

It was a value system rather than a set of beliefs. Its common goals were progress, tolerance, and problems with the Church and royal domination. The idea of Hell became irrelevant. Some date its beginnings to **Descartes's Discourse**. Others date it to **Newton's Principia** (1687).

It was characterized by questioning all the basic concepts that had governed Western Christian and Jewish thinking for millennia, i.e., slavery, male superiority, the husband as absolute ruler of his family, an afterlife, the monarchy, sin, and for Catholics, Original Sin.

Enlightenment men said a God who condemns unbaptized babies to Hell is not worthy of worship. Logic was an established subject since **Aristotle**, but, before the Enlightenment, it was principally used to aid theology, not a tool for examining the workings of the natural world.

Most scientists stayed as nominal believers

1638 A religious awe in the new sciences arose. It put God not in scriptures but in the natural world (**Spinoza**) or at its beginning (deism). So, if God created nature's laws, studying them was God's will (**Descartes**). Man's natural instincts had always been to seek pleasure (**Aquinas** had approved this if it was the right kind of pleasure, *beatitude*) and avoid pain. Most educated Europeans remained nominally religious, including most 17th century scientists who had broken from the scholasticism that dominated universities. Namely, **Bacon, Kepler, Galileo, Harvey, Gilbert, Kant, Boyle, Huygens, and Newton** all said that their studies revealed ordered laws of nature but God was the lawgiver.

The Enlightenment and the ascent of science were one. China didn't need religion.

In the 17th century, the Enlightenment and the ascent of science were one. **Kant** in 1755 said the Enlightenment was "Mankind's final coming of age, the emancipation of human consciousness from an immature state of ignorance and error." **Bertrand Russell** said, "It was a phase in a progressive development that began in antiquity and a reaction to the Protestant reaction to the Catholic *Counter-Reformation*." While there was little intellectual contact between the West and China, Enlightenment intellectuals saw that the Chinese tolerant humanitarian spirit and a well-ordered government showed that a society need not base its ethical and legal systems on supernaturalism.

After God, what?

Ethics: If the Enlightenment debunks God and organized religion, what determines moral conduct? Three answers emerged: 1. The Social Contract theory, 2. Utilitarianism, and 3. Kantian ethics.

1638 Physics: Galileo tried to measure the speed of light, but his instruments were too crude.

Galileo: Determining the speed of electromagnetic waves/light is not easy. (See 1729-**Bradley** 301,000 Kps, 1862- **Léon Foucault** 298,000 Kps, and US Govt: 299,792+Kps) **Galileo** published his most important book *Discourses and Mathematical Demonstrations Relating to Two New Sciences*, (He could not get it published in Catholic Italy, so his students smuggled it to publishers in Holland.)

Galileo, blind, continued his work

He also became blind. Although blind, he designed (but didn't build) an escarpment, a device to improve the pendulum clock. (**Huygens** made one in 1656.) Weeks before **Galileo** died in 1642, **Hobbes** visited from England and told him that his *Discourses book* had been translated into English. **Einstein** called **Galileo** "the father of modern physics-indeed of modern science altogether."

1638 Japan isolated itself

Japan: Japan was divided into three castes, the *Daimyos*, the ruling feudal land-owning nobility, the *Samurai*, the hereditary warriors, and the *Heimin*, the commoners. **Tokugawa Iyasu** was appointed shōgun by Emperor **Go-Yōzei** in 1603 and founded the **Tokugawa** shogunate at Edo (Tokyo).

The **Tokogawa** Shogunate cut ties with the West, isolated Japan from the scientific revolution. Japanese abroad weren't allowed to return. Japan's foreign trade went down 99%.

1640 Roger Williams

Puritan fear of ideas: **Roger Williams**, (1603-83), a Puritan minister, advocate of religious freedom, separation of Church and state, and an early abolitionist, was expelled by the Puritan leaders from Massachusetts for spreading "new and dangerous ideas". He established the Providence Plantations (Rhode Island) based on a strict "wall of separation" between the government and churches. It offered people "liberty of conscience." He also wrote about the English mistreatment of the native Indians.

1641 Meditations

Philosophy: Descartes published his life's work, *Meditationes de prima philosophia* / *Meditations on First Philosophy* in Latin for the learned. He argued for God's existence (see 1644) and a distinction between the human soul/mind and the body.

He wanted to make philosophy less threatening. Meditations said, "ego sum, ego existo" / I am, I exist. Some considered it the principle or beginning of modern philosophy. (See 1644)

Book of Puritan Fear of dissent: Massachusetts Colony Book of Liberties, "If any personj shall worship any other

- Liberties:** god, but the Lord God, or if any man or woman be a witch, or if any person shall blaspheme, they shall be put to death." By 1693, Puritans had killed 36 innocent persons as witches. (**Pascal**, "Men never do evil so completely and cheerfully as when they do it from religious conviction.") Puritans also publicly executed **Mary Dyer, Wm. Robinson, Marmaduke Stephson, & Wm. Leddra** for being Quakers. Puritans did not come to America for religious freedom. They came to more readily persecute others.
- Non-believer or witch? Die**
- Bounties for scalps** Indians: **Peter Minuit**, director-general of the Dutch West India Company, bought Manhattan from Indians in 1626. Settlers came. **Willem Kieft**, the Dutch governor of New Amsterdam (Manhattan), offered the first bounty in North America for Indian scalps, 21 years after the Puritans landed at Plymouth Rock. Bounties for Indian scalps became common in the colonies.(details at 1755)
- 1643 **Philosophy:**) Princess **Elisabeth of Bohemia** (1618-80), brilliant, highly educated, an abbess, asked **Descartes** (Mr. mind/body dualism), "Given that the soul of a human being, is only a thinking substance how can it affect the bodily spirits, in order to bring about voluntary action (**J Speaks** translation.) **Descartes** punted, said the question didn't need an answer. But of course, it did. Paranormal beliefs including theistic beliefs have this *modus operandi* problem. *How* does the mind cause bodily motion? **Descartes** "answer" was evasive. Nor is there yet an agreed-upon theory. No one has yet answered Elisabeth's question. It defeats an incorporeal deity, although recent research in cognitive science influenced by **Peter Putnam**,(1964) a little known genius, is promising. **Putnam's** approach was to consider the mind works on natural selection principles. It learns by repetition.
- Elisabeth questioned dualism. No one could answer**
- 1643 **Physics:** **Evangelista Torricelli** (1608-47), Italian, invented a barometer. It measured air pressure. At sea level, air weighs about 14.7 pounds above a square inch of land (psi). On Mt. Everest it weighs about 5.
- All public writings needed a license.** Anglican fear of ideas: In England, The King's *Court of the Star Chamber* harshly enforced laws that required all public writings to obtain a license. Offenders were tortured, branded, pilloried, jailed, and/or heavily fined. Parliament replaced the *Star Chamber* with a similar court but with its judges. Its officers could search out and destroy unlicensed presses' writings and arrest suspected offenders.
- 1644 In this climate, **John Milton**, a poet who had been previously been denounced for writing in favor of divorce, published an unlicensed pamphlet stridently denouncing censorship, '*AREOPAGITICA*;
Areopagitica a SPEECH of Mr. JOHN MILTON For the Liberty of Unlicenc'd PRINTING To the Parlament of ENGLAND." (Capitals in original) It said, in small part, "As good kill a good person as kill a book. He who kills a good book kills reason itself, kills the image of God. A good book is the precious lifeblood of a master spirit." He wrote in vain. The Parliamentary Presbyterians were intolerant. Parliament ignored **Milton** and strict censorship continued for another 50 years.
- 1644 **Descartes** theorized that the magnetic poles are *on* the central axis of a spinning vortex of one of his fluids. This vortex theory remained popular for a long time. He also said, "The greatest minds are capable of the greatest vices as well as the greatest virtues." And, "As we cannot think of any limit to space, it must be infinite." (ref. **Democritus, al-Haytham, Bruno, Galileo.** (More 1663, '71)
- Science replaced dogma** Largely due to **Descartes**, the world of the non-material, i.e., theology, which had been the focus of study for over a thousand years, became less important. Before **Descartes**, dogma was the predominant course of study, mathematical physics a minor science. After him, it was reversed. This was one of the most radical changes in the history of thought. Despite his piety, his works were put on the *Index* in 1663. **Voltaire** said **Descartes** gave sight to blind men. Universities established chairs in natural philosophy. Sciences began to specialize with the humanities, (which are now converging, due to **Einstein**).
- 1644 **China** The new **Qing** Dynasty emperor asked for Western scientific knowledge. The **Jesuits** sent in experts. They told the emperor that family rites honoring ancestors were civil ceremonies which did not necessarily conflict with Christianity. They performed other tasks for the emperor. Their main subject was astronomy. In 1674, the emperor gave control of China's observatory to the Jesuits. Despite **Copernicus** (1543), the Jesuits taught Chinese that the Earth was the center of the universe, (see 1760)
- c.1644 **Political Theory, aristocracy:** **Peter Stuyvesant** (1592-1672) Dutch governor of New Amsterdam, "To give liberty to the Jews will be very detrimental . . . Giving them liberty, we cannot refuse the Lutherans and the Papists." (The Dutch settlements around Manhattan were ceded to England in 1664 becoming New York.) Both the Northern and Southern colonies had slaves and indentured servants. One-half to two-thirds of the immigrants who came to the American colonies arrived as indentured servants
- 1646 **Political Theory, democracy:** *The Levellers*, Brits led by **John Lilburne**, argued unsuccessfully for universal suffrage, equal electoral districts, biennial parliaments.

1647 **Quakers** Religion: **Quakers**: **George Fox** (1640-91), in England founded the *Christian Society of Friends* (Quakers), breaking away from the established Anglican Church of England. *Friends* renounce violence and oath swearing. They have no ministers or liturgy. They teach an "inner light" of divine revelation. They spread their Christian sect in England and overseas and came to America in the 1600s.

Women were active in Quaker affairs **Quakers**: Women took an active role in religious affairs. Quakers believed that "Christ has come to teach his people himself," stressing a direct relationship with God through **Jesus**, and a direct religious belief in the universal priesthood of all believers through both direct religious experience and the reading and studying the Bible. In Massachusetts, Puritans persecuted them. Historian **James Adams** later wrote that *The Founding of New England* was based on the conflict between the poor and the bigoted theocracy. (more Quakers 1656, 1765, 1854)

1647 **Epicureanism**: **Pierre Gassendi** (1592-1655), a French Catholic priest and scholar, published *The Life and Morals of Epicurus*, giving Epicureanism as a better and more rational alternative to Aristotelianism. English scientists liked it. He published a commentary on **Diogenes Laertius's** *Life of Epicurus*.

1648 **Europe was in ruin by useless senseless religious wars.** **Killing for God**: *The Thirty Years War* (1618-48) between Catholics and Protestants, was one of several useless "wars of religion" and the bloodiest war before World War 1 (1914-18). It left much of Europe depopulated. German lands went from 17M to 8M people, destitute, in ruin, traversed by pitiable bands of refugees. Cossacks slaughtered thousands of Jews. Many such impoverished poor went to America as indentured servants..

The *Treaties of Westphalia* (Muenster and Osnabrueck) ended the war. It ratified the political realities; Switzerland and Holland became independent. "Germany" was not then a country. It was c.300 independent *de facto* sovereign principalities, free cities, kingdoms, and bishoprics.

Princes chose their land's religion. The treaties effectively ended Pope **Innocent 10's** all-European political power. So he attacked the treaties as void.

1649-51 **"Think it possible ye may be mistaken"** **England**: **Oliver Cromwell** (1599-1658), an admirer of **Machiavelli**, and a religious Puritan, led a civil war against King **Charles 1**. **Cromwell** wrote the General Assembly of the *Kirk* / Church of Scotland asking it to leave King **Charles**. His famous plea, "I beseech ye, in the bowels of Christ, think it possible ye may be mistaken." But the *Kirk* supported **Charles**. **Charles** and the Anglican Church tried to rule without Parliament. **Cromwell** had Parliament try **Charles** for high treason and beheaded.

Parliament declared, "The People are, under God, the original of all just power. The House of Commons (i.e., themselves, rich white, propertied males) have supreme power." Parliament became the supreme power under Cromwell, the first true government of laws, albeit corrupt.

The king's power was reduced forever. Parliament was hugely unrepresentative. Only about four percent of adults could vote. Only Anglicans were allowed to be the king.

Government is of property, by property, and for property. **Cromwell** was installed as Lord Protector of the new commonwealth. He betrayed his lower class supporters who had put him in power. He gave them no role on his government, saying, "You possess no property, and government always has been, and should continue to be of property, by property, and for property. Trust us, the men of property. We will govern in your interest as well as our own." **Cromwell** prevailed as most of his army officers owned property and agreed with him. Some protesters were killed.

1649-1651 **No Catholic mass in England** **Cromwell** also killed Catholics. "I meddle with no man's conscience; but if you mean to celebrate the mass, understand that in no place where the power of the Parliament of England prevails shall that be permitted." In 1652, as head of the army, **Cromwell** killed tens of thousands of Catholic Irish and Scots, men, women, and children, and brutally massacred the inhabitants of Drogheda, Ireland.

The Irish ruling class (i.e., clergy, professionals, land owners) were all Anglicans in mostly Catholic Ireland. This period was known as the *Protestant Ascendancy*. Catholic lands were confiscated and sold cheap to Anglicans. **Cromwell** is of course still rightly hated by the Irish.

1650 **James Ussher** Theology: Bishop **James Ussher** of Armagh (1581-1656), Anglican Primate of All Ireland, Privy Councillor. A pious hypocrite, despite that Anglican dogma was copied almost entirely from Catholic dogma, wrote, "The religion of the papists is superstitious and idolatrous; their faith and doctrine erroneous and heretical; to tolerate them or to consent that they may freely exercise their religion is a grievous sin."

Creation? October 23, 4004 BC at 9 am. **Ussher** calculated that God created the Earth at 9 am on October 23, 4004 BC. Adam and Eve were driven from paradise 18 days later. **Ussher** calculated from "begat" to "begat" to "begat" etc. in the *Bible* to calculate his date. **Kepler** calculated 3992 BC. **Philip**

Melanchthon 3964 BC. **Luther** said 3961 BC. **Newton** said 3998 BC. **John Lightfoot** 3960 BC. **Marian Scotus** 4192 BC. **Jews** 3761 BC. **Maimonides** 4058 BC. (Two centuries later it became known that there were flourishing civilizations long before all such religious opinions.

1650 **Physics: Otto von Guericke** (1602-86), German, scientist, politician, diplomat, brewer, Burgermeister of Magdeburg, most of whose population had been killed in the religious wars, designed an air pump, devised "*Magdeburg hemispheres*" (two hemispheres placed to make a sphere) to illustrate the pressure of air and the physics of vacuums.

He also correctly discovered that light but not sound can go through a vacuum. (more 1664)

Thinking **Antoine Arnauld**, *The Art of Thinking*; The mind has operations like conceiving, judging, reasoning, ordering.

1650+ **North Europe rises** Overview, Europe: The intellectual and commercial center of Europe had shifted to North Europe. The failure of Europeans to agree upon the truths of religion, within as well as across state boundaries, furthered secularism and modern science. In states where the Protestant Revolt, the Reformation, came closer to success, i.e. where lay and church forces joined to impose a religious conformity, there was intellectual stagnation. Religion became more private. A merchant class grew. In France, nobles were lightly taxed. Educated persons were dominated by two concepts, 1. the advances in science had reduced Nature to mathematics and 2. the thought that humans could progress through reason. But, as always, the vast majority of people were not part of the *Enlightenment*. They were poor and illiterate. If there were a very smart boy spotted early, he would be taken to a monastery to be a priest or monk.

Overview: The collision & interaction between the Renaissance & the Protestant Revolt (the Reformation), energized the intellectual and moral energies of Europe. No later time has been so revolutionary. The common languages, French, Spanish, Portuguese, Italian, and German were used more in printing.

Trade with the Americas. Missionaries States turned to frontier and colonial expansion. Spain imported gold and silver **from the Americas.** Furs from Siberia and Canada, gold and diamonds from Brazil (from 1695) were the most important imports. Europeans changed the Caribbean into sugar plantations based on slavery. Exploration slowed; trade expanded. Hundreds of Spanish and Portuguese missionaries turned South and Central America into Catholic countries. Concurrently, *Islam* spread across Central and S E Asia.

1651 **The New Almagest measured falling objects** **Physics: Giovanni Battista Riccioli** (1598-1671) an Italian astronomer and Jesuit priest, published a massive *New Almagest*, describing experiments with falling bodies, mapping the moon, and pendulums. He devised 126 arguments concerning the motion of the Earth, and introduced the current scheme of lunar nomenclature. **Riccioli** is credited with being the first person to precisely measure the acceleration of falling objects. He measured that the distance a falling object increases by the square of the time period of the fall, indicating constant acceleration.

Leviathan Hobbes, materialism. Political Theory, monarchy: Thomas Hobbes (1588-1679) Brit, a royalist, founding father of metaphysical materialism, repelled by the religious wars, wrote *Leviathan, or the Matter, Form, and Power of a Commonwealth, Ecclesiastical and Civil*, the first general theory of politics written in English. It showed the advantages of a strong government and the importance of submission to civil authorities. He defended an absolute monarchy. He admired **Euclid's** rigorous building truths from unassailable axioms.

1651 He said, "So that in the first place, I put for a general inclination of all mankind, a perpetual and restless desire of power after power, that ceaseth only in death." He said that peace could never be established unless a supreme power, preferably a monarchy, is established and obeyed.

Hobbes And its power cannot be questioned. He said that the sovereignty of England had been put into two powers, which had caused two civil wars. While a king's word must be obeyed, the king should be governed by reason, i.e., natural law. **Hobbes** sought to build his philosophy like **Euclid** built his theorems, a step by step construction of a system from presumably unassailable truths / axioms as the perfect model for the scientific method. **Hobbes's** starting point was that everything in the universe was matter in motion. He disagreed with **Descartes's** separation of mind from matter .

Problem of Evil / Suffering **Hobbes** described the *Problem of Evil* as expressed in the *Hebrew Bible*.. The Jewish David asked "How good is the God of Israel to those that are Upright in Heart; and yet my feet were almost gone, my readings had well-nigh slipt; for I was grieved at the Wicked, when I saw the Ungodly in such Prosperity. And Job, how earnestly does he expostulate with God, for the many Afflictions he suffered, notwithstanding his Righteousness? (*Psalms* 72:1-3) He did not answer the problem.

Man's basic passions: appetite & Philosophy: To explain the origin of political institutions, he analogized Man and the state. He said the two basic "passions" of humans were appetite and aversion. "Happiness is getting

aversion. Life of man in Nature is solitary, poore, nasty, brutish, and short.	as many of the good things one desires and power is the way to get such things.” “So that in the nature of man, we find <u>three principal causes of quarrel. First, competition; second, diffidence; third, glory.</u> The first maketh humans invade for gain, The second, for safety, and the third, for reputation.” Thus <u>power is a basic characteristic of Man</u>, which leads to aggression against others. “In the state of nature, <u>i.e., without a political community,</u> there is “no property, no justice or injustice, there is no right or wrong, only self defense. <u>In a state of nature,</u> there is no knowledge of the face of the Earth; no account of time; no arts; no letters; no society; and which is worst of all, continual feare, and danger of violent death; <u>And the life of man, solitary, poore, nasty, brutish, and short.</u>”
1651 So, men enter a Social Contract	So men enter into a social contract to establish a state to keep peace and order. (Hume a century later said there was no state had begun by a social contract, that states arose as communities of obedience.) Hobbes: “As men are selfish by nature, reasonable but predatory, a powerful absolute ruler, a leviathan (including control of religions), is necessary.” He was hated and shunned
Most materialist philosophy of the 17th century. Religious doctrines were insignificant sound	Hobbes’s philosophy was the most materialistic philosophy of the 17th century. He explained everything on mechanical principles. Men were superior kinds of machines. “All knowledge comes by way of the senses, and the objects of knowledge are material bodies obeying physical forces.” The result of his philosophy was to make the civil ruler, not the priest, the supreme arbiter of moral law and any religion be subordinate to the civic authority, as Queen Elizabeth 1 had done. Religious doctrines were “insignificant sound.” Religions were formed and maintained by men to control their subjects. (As Machiavelli said, see 1532), and “<u>morality was essentially a set of rules that humans had agreed among themselves to make living together possible.</u>”
Religions came from four mistakes	Hobbes attacked the Catholic Church. He said, “The Papacy is not other than the deceased ghost of the Roman Empire, sitting crowned on its grave.” We do not know anything about God other than that He exists. He called the Catholic Church the “Kingdom of Darkness. . . <u>Hell is a fantasy to control people.</u>” Like Spinoza, he analyzed the <i>Bible</i> as a mixed-up historical text. He disdained Protestants as well. He opposed the interference of the Puritans and Presbyterians in civil government. He said <u>Religion is derived from four mistakes</u>, 1. belief in ghosts, 2. ignorance of second causes, 3. devotion to what one fears, and 4. taking of things causal for prognostics.
Democracy is dangerous	Political Theory, monarchy: He said democracy was dangerous. “A democracy is no more than an aristocracy of orators. The people are so easily moved by demagogues that the government must control speech and press.” Said, physics, psychology, and politics were the most useful fields of study. In war, force and fraud are the cardinal virtues (pure Machiavelli).
Leviathan changed thought from theology to why do people like religion.	Anthropology: <u>Leviathan</u> changed the subject of political thought from theology to the anthropology of religious passions. He asked how people act, and <u>why do they believe God speaks to them.</u> He said to understand <i>that</i> may lead to why religious convictions lead to political conflict. Hobbes (& Locke 1689) detached government from its theological roots. He offended rationalists by claiming that men, far from being capable of the highest intellectual achievements, were dangerous and aggressive creatures. <u>Leviathan is thought by many to be the most influential political treatise ever written</u>, even more powerful than Machiavelli’s <i>The Prince</i> (1532). Parliament condemned it..
1651	“The original of all great and lasting societies consisted not in the mutual good will men had toward each other, but in the mutual fear they had of each other. Hobbes was largely responsible for legitimizing <u>rationaly examining the Bible.</u> The Church of course retaliated. He was temporarily exiled to France. He described the immortality of the soul idea as a Greek “contagion” in Christian doctrine. Like Aristotle, Hobbes said science is the knowledge of consequences and dependence of one fact upon another. Almost all defenders of Christianity at the time aimed their arguments against the “atheistic arguments of Hobbes. He was the first known to use the precise phrase, “Knowledge is power” (in 1655). Hobbes said, “They that approve a private opinion call it an opinion; but those that dislike it, call it heresy.” And, “Almost all men think they have [wisdom] in a greater degree than [all other men].” In 1654, he said, “Liberty is the absence of all impediments to action not due to nature or oneself.”
1654	Hanna Arendt in 1951 argued that Hobbes’s philosophy opened the way for 18th century racial doctrines that influenced how <i>rights, liberty, and equality</i>, were understood by the founders of America. Hobbes distinguished between a <i>man in nature</i> (<i>physis</i>, Blacks, servants) and a <i>man in society</i>: (<i>civis</i>, propertied) Physics: Blaise Pascal (1623-62), French prodigy, <u>proved</u>: 1. <u>Air was not weightless</u>, so air

**Blaise
Pascal,
Hydraulics
probability**

pressure decreased with altitude [We live at the bottom of an ocean of air. See 1643-Physics]
2. When pressure is put on a fluid in a closed container, it exerts pressure everywhere in that container. [Illustration: Step on the brakes, fluid is forced to all wheels equally to engage the brake pads.]
3. A vacuum exists at the top of a barometer. **Descartes** disagreed, **Pascal** was right.
4. With **Pierre de Fermat**, he discovered the mathematical theory of probability.
5. To show a hypothesis is false, it is only necessary to show it leads to something contrary to a single one of the phenomena basing the hypothesis. **Popper** (1927) made this idea famous.

1654 **Pascal's theology**: After an epiphany, **Pascal** devoted his life to Christ. He wanted to keep science and religion united, "He who cannot believe is cursed, for he reveals by his unbelief that God has not chosen give him grace. There are two essential religious truths, there is a God, and there is a corruption of nature which makes men unworthy of Him. But he also said, "Custom is the source of our strongest and most believed proofs; it persuades the mind without thinking about the matter. . . Christians are Christians as they were born to Christians. . . Imagination decides everything." (more **Pascal** 1670)

**Pascal's
philosophy**

"Reason commands us far more imperiously than a master; for in disobeying a master, we are unfortunate, and in disobeying reason, we are fools." "Reason is inadequate to satisfy people."

**Man is but a
feeble reed,
but he is a
thinking
reed**

"The supreme function of reason is to show people that some things are beyond reason."

"Man is but a reed, the most feeble thing in nature, but he is a thinking reed."

"Thought makes the whole dignity of persons; therefore seek to think well; that is the only morality." "Men never do evil so completely and cheerfully as when they do it from religious conviction." "If we violate the principles of reason, our religion will be absurd and ridiculous." "Faith is different from proof; proof is human; faith is a gift from God."

"Atheism shows strength of mind, but only to a certain degree."

"The heart has its reasons, which reason does not understand." (more **Pascal** pp. 398, 415, 418, 421)

**Strong
faith
reinforces
intolerance**

1655 **Thinking wrongly**: **Isaac de la Peyrere** (1596-1676), French, influenced by **Hobbes**, said that based on *Genesis's* two creation stories, there were humans before Adam. *The Inquisition* burned his book, imprisoned him. He recanted and was freed. **Will Durant** said, "Intolerance is the natural consequence of strong faith; tolerance grows only when faith loses certainty; certainty is murderous."

- **Emma Goldman**, 19th century feminist, "The Inquisition and the Jesuits adopted the slogan that the end justified the means and subordinated all morality to it."

**Pendulum
clock**

1656 **Physics, astronomy**: **Christiaan Huygens** (1629-1697), Dutch, lived in Paris, made the first practical pendulum clock. It was spring-driven. So accurate that clocks could have minute hands. He also made the first balance spring clock. (**Hooke** (1665) developed a balance spring watch at about the same time.)

**Gravity and
magnetism
showed that
force can act
at a distance**

Huygens studied centrifugal and centripetal force and generalized the concept of the center of gravity in strict mathematical terms, as **Newton** later showed. Gravity is the centripetal force causing astronomical orbits. Looking through a refracting telescope he built, he discovered that Mars rotated (every 24.67 hours) and that Saturn had rings. **Huygens** (like **Galileo**) showed that force could act at a distance (magnetism and gravity) and need not be directly applied.

c. 1656 **Christianity**: Puritans in Massachusetts severely persecuted peaceful Quaker missionaries, executed them, stole their property, deported them. Quakers left, went mostly to Pennsylvania. .

**Leopoldo de
Medici is
bought off**

1657 **Fear of ideas**: Prince **Leopoldo de Medici** admired **Galileo**. He founded and led an academy of experimental science, the *Accademia del Cimento*. Its fundamental law was "the repudiation of any favorite system or sect of philosophy and the obligation to investigate nature by the pure light of experiment." The Vatican declared the academy irreligious. **Leopoldo** was not a cleric of any sort. But in 1667, Pope **Alexander 7** made him a cardinal. Without him, in a few years the Academy faded.

c. 1660 **Intellectual activity**: The center of most intellectual spheres was moving northwest from Rome. 1. The microscope was helping scientists as the telescope did. 2. Formal scientific networks (like *the Republic of Letters*) greatly aided the spread of scientific knowledge. 3. An informal group of scientific scholars known as the Invisible College became *The Royal Society for the Improvement of Natural Knowledge* in London under **Henry Oldenburg**, its secretary. He shaped and promoted it to contrast to the Scholastic / Aristotelian traditions of Cambridge and Oxford. It aimed to study nature rather than books. **Robert Boyle** was a founding member. Most Royal Society members were Puritans and friendly to science. Its charter said their study of science was to glorify God.

**Royal
Society
founded**

1661-1699 Science: Hooke Boyle Bayle Spinoza Newton-Principia

Note: Most major scientific discoveries mentioned herein were preceded by many smaller discoveries not mentioned herein that contributed to and paved the way for the major discovery.

1661 **Isaac Newton.** **Physics:** **Isaac Newton** (1642-1727), the pre-eminent scientific genius of all time, at 19, entered Trinity College, Cambridge, where students had to swear an oath to Anglicanism. He made three great scientific discoveries by age 25, 1. differential calculus, 2. the composition of light, and 3. gravity. Differential calculus is the math of instantaneous rates of change. It has two main branches. It permits the calculation of rates of bodies in motion such as finding tangents to curves, given the rate of change of a quantity. It derives the quantity itself, while *integral* calculus does the converse. Algebra and geometry deal only with static objects. (**Gottfried Leibniz** in 1673 developed his version of infinitesimal calculus.)(more **Newton** 1663-70,72-78,84-87)

1661-62 **Boyle, wrote thirty treatises** **Sceptical Chymist** **Chemistry:** **Robert Boyle** (1627-91), Anglo-Irish, wealthy, well educated, a lord's son, spent a year in Florence studying **Galileo**, a member of the "invisible college," that became the *Royal society*, He was an empiricist, considered to be the first modern chemist, published thirty scientific treatises, principally on physics, chemistry, physiology, and medicine. His work led to discoveries regarding the role of air in the propagation of sound, the thermometer, the barometer, phosphorescence and electricity. Importantly, he established a lab at Oxford to study chemistry **Boyle** helped move men's minds out of alchemy. In 1661, he published *The Sceptical Chymist*. It critiqued parts of alchemy (trying to turn metals into gold), which he thought ill-founded, although he experimented in alchemy, with its attachment to occult and mysticism, was still important even in some educated men's minds. He was a devout believer, wrote extensively on theology.

Boyle's Sceptical Chymist He rejected **Aristotle's** view that logical argument was sufficient to prove a case and favored Epicureanism. *Sceptical Chymist* denied **Aristotle's** view of four elements (earth, water, air, fire). He said there may be more elements. It also denied **Paracelsus's** concept of three principles (mercury, sulphur, salt). (**Robert Hooke** (ref 1662, '65-66) was a lab assistant to **Boyle** from 1655 to 1661. **Hooke** could construct the air pumps **Boyle** needed that were invented by **von Guericke** (1650.)

Molecules & elements. He determined that matter could consist of more than one element. **Boyle** introduced the modern concept of elements. He said that matter consisted of various sorts and sizes of tiny particles he called corpuscles (now atoms). **Boyle** was the first modern scientist to conceive that substances could consist of more than one element. Previous to him, matter was **Aristotle's** fire, water, earth, air. *Sceptical Chymist* showed the fallibility of the alchemist theory that all mixed bodies could be analyzed into their elementary ingredients by fire. He said that those bits of matter which could not be decomposed must, until further experiment, be considered as elements.

Boyle made chemistry as a rational & experimental science. That is, elements are the smallest component of matter that can be detected by analysis. This is still valid. *Sceptical Chymist* correctly argued that matter's basic elements-corpuscles (now called atoms), could combine themselves into clusters (now called molecules), and that chemical change from rearrangements of the clusters.

Molecules are tiny tiny. A teaspoon of water has 200 billion billion molecules.
1662 He also introduced the concepts of alkali and acid.

Boyle was one of the first to speculate about the *concept of absolute zero, primum frigidum*, the coldest temperature that a substance could reach. He also discovered that air was necessary for the propagation of sound and burning. (more 1666). **Robert Hooke** (1635-1703), (ref 1661), **Boyle's** assistant, became the first curator of experiments of *the Royal Society*.

Elements, atoms, molecules **Chemistry:** **Boyle** said that every element (gold, silver, iron) is made up of one specific type of atom. Atoms of different elements differ in size, weight, and their constituent particles;
(Two centuries later, in 1897, atoms were discovered not to be the ultimate elementary

Anglican clergy said Boyle was destroying religion.

constituents of matter. Atoms were first found to be made up of tinier elementary particles, now called sub-atomic particles.). **Boyle** started chemistry as a rational and experimental science. Anglican theologians at Oxford said **Boyle's** researches were destroying religion. Denying God was a capital offense. **Boyle** replied that his studies were for the greater glory of God. (more **Boyle** 1666).

Physics, Gasses: **Richard Towneley** (1627-1707) Brit, mathematician, natural philosopher, astronomer, and **Henry Power** (1623-68) Brit, physician and experimenter, determined that the volume of gas was exactly inversely proportional to pressure. They explained this to **Boyle**. He published it. So it is now called **Boyle's Law of Gasses**. This pressure/volume inverse relationship led to the thesis that gasses must be made up of tiny corpuscles with a large amount of space between them.

How do we think? 3 and 7 were magical

How we think: Around this time, ancient theories of the mystical power of numbers, especially 3 and 7, became part of Christian thinking, impeding scientific thought. Theologic and metaphysical substitutes for scientific thought, like the idea that the perfect line is a circle, so planets must travel in circles, led astronomy astray even after **Kepler**.

1662 Parliament's Act of Uniformity said the Anglican *Book of Common Prayer* the only legal form of worship.

1663 Optica Promota

Physics, Optics: **James Gregory** (1638 -75) Scot, mathematician, astronomer, said that a *reflecting* telescope with a parabolic mirror would correct spherical aberration and the chromatic aberration of *refracting* telescopes (invented in 1609). Thus, a six inch *reflecting* telescope would have the same effectiveness as a six foot *refracting* telescope. His *Optica Promota* described his design for a *reflecting* telescope. But he couldn't find anyone capable of constructing one.

Telescope

Gregory also described the method for using the transit of Venus to measure the distance of the Earth from the Sun, which was later used by **Edmund Halley** (ref. 1678) and adopted as the basis of the first effective measurement of Sun-Earth distance. It is now called an *Astronomical Unit*.

Robert Hooke since 1662, curator of the *Royal Society*, and **Newton** (ref. 1661, '65-66) saw **Gregory's** telescope design. (**Newton** built the first one in 1668. **Hooke** built one in 1673.)

40-60K women burnt as witches

Christianity: In Scotland, Presbyterian ministers burned nine women as witches. Their argument was that if God could punish people by fire for eternity in Hell, so could his ministers on Earth. Modern scholars estimate 40,000-60,000 people have been were burnt as witches in Europe and the Americas, mostly 1400-1800 (Wikipedia). (see 1524- **Luther**) The Vatican said that to spare a witch was an insult to God.

Descartes Treatise on the World and light. printed 1664, after he died

Physics, Biology: (In 1633, after years of study and travel, **Descartes** (ref 1620, '23) finished *Traite du monde et de la lumiere / Treatise on The World and Light*, which organized all current knowledge into one structure, including the first complete statement of the law of *inertia*. He saw what the *Inquisition* had done to **Galileo** for teaching heliocentrism, so he did not publish it. He died in 1650. It was finally printed in 1664. It confirmed **Copernicus's** heliocentrism. It also described animals as purely mechanical beings.

Inertia Momentum

Trait said: 1. A body always moves in the same direction it is headed at a constant velocity (speed in a specific direction). When **Newton** published (1687) this was his first law of motion, *inertia*).

2. A change of *momentum* of a body is proportional to the force put on the body, and happens along the straight line on which the force is pushing. (*Momentum* is mass of a body times its velocity) and 3. All forces between two objects exist in equal magnitude and opposite direction.

Physics: **Descartes** and **Newton** (later) both believed in cosmological (first cause) arguments for a God. Despite **Descartes's** devotion, his books were put on the *Index*. Catholic universities and Protestants condemned his books. (More **Descartes** 1671)

1664 Moliere, Le Tartouffe

Literature: **Moliere**, pen name of **Jean-Baptiste Polequin** (1622-73), master of comedy in Western literature. *Le Tartouffe /The Hypocrite*, skewered religious hypocrites. *Le Misanthrope* 1666, ridiculed social mannerisms. *Le Bourgeois Gentilhomme* 1670, ridiculed social climbers and others. "There are pretenders to piety [clergy] as well as to courage." "A learned fool is more foolish than an ignorant fool." So nobles and the Church attacked him.

- 1665 Physics, optics: **Francesco Grimaldi** (1618-63), Jesuit priest, physicist, astronomer, discovered that light rays don't always go straight, they *diffract*, that is, they spread around obstacles in waves. This occurs same as sound and all other electromagnetic radiation, such as X-rays and gamma rays.
- Robert Hooke polymath** 1665 Physics: **Robert Hooke** (ref 1662), *Curator of Experiments* of the new *Royal Society* was also an architect, city planner, and musician. He had one of the most inventive and farseeing minds in the history of physical science. He contributed to physics, history, chemistry, meteorology, geology, and astronomy. His discovery of the cell and cell theory made his scientific reputation. He never saw a living cell. He coined the word *cell* in describing biological observations
- Micro-graphia, the first science best seller** He invented the first practical compound microscope and used it for his book, *Micrographia, or Some Physiological Descriptions of Minute Bodies Made by Magnifying Glasses with Observations and Inquiries Thereupon*. One of its excellent drawings was the compound eye of a fly. It was the first major publication of his *Royal Society*. It became the first scientific best-seller, inspiring a wide public interest in the new science of microscopy (see **Leeuwenhoek** 1672) .
- Hooke's several accomplishments** *Micrographia* originated the biological term *cell*, describing and illustrating microscopic and telescopic observations, and his correct theory that fossilized wood was wood that had been permeated by water containing minerals that over time evaporated away.
He said combustion was anything combining with oxygen. He built the first
1665 practical compound microscope. He drew good illustrations of microscopic objects. (**Van Leeuwenhoek** invented a far simpler and more powerful microscope in 1672.)
- Heat expands gas** **Hooke** was the first to say that matter expands when heated and air was made up of tiny particles separated by large distances. **Hooke** contributed greatly as a builder of scientific instruments.
- 1665- 66 **Newton on his farm** Physics, Optics, **Newton**: The plague closed Cambridge for 18 months after **Newton's** 1665 graduation. During this time he lived on his family farm. There, alone, he used calculus to find the tangent and the radius of curvature at any point on a curve. He devised instruments to grind lenses with non-spherical curves. There he formulated but did not publish his law of universal gravitation.
- Sunlight is colors of light** In a darkened room with a small hole for sunlight, **Newton** directed a beam of sunlight through a prism. He saw a prism with different thicknesses made a beam of light with of the colors of a rainbow. That is, the prism had separated the different colors that made up sunlight. He thought light was tiny corpuscles/particles. Sunlight Itself is not visible to humans.
- Optics** **Newton** likely had read **al-Haytham's** (1080) and **Roger Bacon's** work (1250) on optics, and **Francesco Grimaldi's** 1665 work on diffraction. Others had experimented with light and prisms and saw colors coming out of the prisms. They thought that somehow the prism colored the light. It didn't, it just separated the light waves that collectively made up sunlight. **Newton** had no concept of electromagnetic waves, which is what light was found to be 150 years later.
He admitted he didn't know how the colors were made. He just measured their refraction.
- Gravity has an inverse squared attraction** On the farm, he discovered, but did not publish, his finding that planets orbit the Sun in ellipses, not circles. **Kepler** had determined this by measurement and observation. **Newton** determined it by mathematical calculation. **Newton** also quantified that gravity's attractive force decreases as the square of separation of bodies.
Newton took **Descartes's** argument that curvilinear motion seems inconsistent with inertia. He concluded that the force that caused an apple to fall was the same force that the moon "fall" towards Earth when orbiting Earth and the Earth similarly stayed in *its* orbit around the Sun
He thus unified the Earth and celestial mechanics. He combined his laws of motion with gravity. He did not understand *how* gravity works or what it *is*, just what it *does*. Newton did not hypothesize. (**Einstein** in 1915 said gravity is a consequence of the curvature of space-time caused by the uneven distribution of mass. This was totally unknown at the time)
- 1666 The *Academie des Sciences* was founded in Paris. Their meetings and journals spread

scientific knowledge, breaking the monopoly of the Catholic universities.

1666 **Hooke** To establish priority of his ideas, **Hooke** wrote the *Royal Society*, his employer, “I will explain a system of the world very different from any yet perceived . . . based on the following positions:

Hooke's Rules of Motion

1. All the heavenly bodies have not only a gravitation of their parts to their own proper center, but that they also mutually attract each other within their spheres of action.” (The concept of gravity was known but not *quantified*, except by **Newton** who kept this knowledge secret.)
2. All bodies have a simple motion, and will continue to move in a straight line unless deflected from it by some extraneous force (**Descartes** and **Newton's** first law of motion, *inertia*). A continuous extraneous force causes a body to describe a circle, an ellipse, or some other curve.
3. This [extraneous force] is much the greater as the bodies are nearer.” That is, he saw that gravity was stronger between close objects but he did not quantify/measure the gravitational attraction.

Physics: **Hooke** also made a device measuring the star-to-horizon angle, an astrolabe. (**Halley** made one in 1692. **Thomas Godfrey** and **John Hadley** made one in 1731, an octant).

In geology, **Hooke** disputed the biblical account of the age of the Earth and said fossils on mountains were due to earthquakes that created mountains. As a rival to **Newton**, **Newton** hated **Hooke**. **Hooke** gained stature as Surveyor of London after a fire destroyed much of the city.

1666 Biology: **Marcello Malpighi** (1628-94), Italian anatomist, discovered blood capillaries with the new microscope, closing the flow of blood from arteries to veins that **Harvey** in 1628. had said must exist. He wrongly thought humans pre-formed in the mother's egg.
He also discovered that insects breathe through holes in their skin.

1666 Origin of Forms

Chemistry: **Boyle** (ref. 1661, '64) published *The Origin of Forms and Qualities*. It said everything is built of atoms, tiny indivisible portions of an element, his mechanical view of nature.

Origin of Forms also explained gas's volume/pressure inverse relationship that he had learned from **Towneley** and **Power** and published in 1662, namely, “At fixed temperature, for a fixed mass of gas, its volume times its pressure (measured from absolute zero) is a constant. Halve the volume, pressure doubles, and of course, vice versa. This is **Boyle's law of Gasses.**

Mass is how many atoms. Weight is gravitational attraction

Mass is not the same as weight. Mass is the quantity of matter in an object (like 10T atoms), it never varies. Weight is the gravitational attraction between objects which depends on their masses and their separation. (See 1701-**Amontons**, 1787-**Charles**, and 1802-**Gay-Lussac**, who added temperature to **Boyle's** laws of gasses. 1834- **Claperyon**, and 1872 -**van der Waals**, for more advances regarding the laws of gasses.)

1667 **Math:** Cambridge reopened, **Newton** returned, became a Fellow of Trinity College, showed his works on calculus; calculated the Moon's orbit, measured the Moon's period, discovered the binomial theorem. **Newton** feared others would steal his ideas, so he kept his work secret.

Religion: Poet **John Milton** (1608-74) wrote *Paradise Lost* to “justify the ways of God to man.” It relates the biblical story of the fall of man, the temptation of Adam and Eve by the fallen angel Satan and their expulsion from the Garden of Eden. It is in ten books with over 10,000 lines of blank verse.

Problem of Evil

In its final pages **Milton** gives the same answer to the *Problem of Evil* as **Augustine**: all suffering and death on Earth are the consequence of *Original Sin*.

1668 Biology, a victory for science: **Francesco Redi** (1626-97) Italian, debunked the theory that maggots generated spontaneously. He said maggots come from eggs laid by flies. He also showed that snakes' poisons only became poisonous when in the bloodstream and harm could be prevented by stopping the blood flow, ligature. He was the father of modern parasitology.

1668 Math: **James Gregory** (ref. 1663-reflecting telescope), wrote *Geometriae Pars Universalis* gave both the first published statement and proof of the fundamental theorem of the calculus

Geometriae Pars Universalis (stated from a geometric point of view, and only for a special class of the curves considered by later versions of the theorem). He was made a Fellow of the *Royal Society* and professor of math at St. Andrews and Edinburgh. **Newton** built the first *reflecting* telescope that **Gregory** had designed.

Luther ironically spurred secularism Humanism: Luther's Protestant Reformation, meant to be intensely religious, caused widespread skepticism of the Catholic Church, and ironically also caused people to doubt the divinity of all churches resembling the Catholic Church, namely, Protestant churches, which were seen as political moves by princes seeking merely to avoid Vatican taxes, rather than actual theological differences.

1669 Political Theory, Feudalism: John Locke (1632-1704) Brit, was a wealthy philosopher, physician, a major investor in the silk trade and *The Royal African Company* (the British slave-trading company). (the French slave trade was run by *Le Compagnie Perpétuelle des Indes*.)

Locke also had an income from mortgages, loans, and shares of the Bank of England. In 1663, King **Charles 2** had given huge patents of land that became Virginia, the Carolinas, and Georgia to eight English nobles. The resident American Indians weren't consulted. The nobles financed an expedition to settle the lands. It was named Carolina. Lord **Ashley** (1667-75, later Earl of **Schaftesbury**), was the leader of the Carolina grantees. **Locke** was the principal advisor to **Ashley / Shaftesbury**. **Locke** became the manager of the enterprise.

Locke designed a colony with slaves **Locke** drafted a *Fundamental Constitutions for the Government of Carolina*, that would establish a feudal aristocracy in the Carolinas where the eight nobles would get the best 40% of the land and only a noble could be its governor. Article 110 stated that "Every freeman of Carolina shall have *absolute* power and authority over his negro slaves,"

The provisions of the *Constitutions* were never fully employed nor ratified, but they shaped the land distribution in the Carolinas. The wealthy got the best land near the coast, forcing small farmers into the western mountains of the colony. (More **Locke** 1674, '88-9)

1669 Physics, Optics: Newton worked out the details of his 1665 finding that sunlight was made up of different colors. He took over the *Lucasian* chair in math as Cambridge's youngest professor when his mentor, **Isaac Barrow**, resigned in his favor. (**Stephen Hawking** (1941-2018) held this chair.) **Newton's** first lectures in 1669-71 were on optics. He did not repeat any lectures but transcripts were made.

1670 Physics: John Wallis (1616-1703), Brit, like **Hooke**, suggested the law of conservation of momentum. (Soon to be **Newton's 2nd law of motion**). He was the most influential mathematician before **Newton**.

c.1670 Physics: Robert Hooke (ref. 1665) proved that the center of gravity of the Earth and Moon is the point describing their elliptical orbit around the Sun. He *inferred* that Jupiter rotated, invented a balance spring for a watch, regulated by a tiny pendulum. In 1672, he saw that light diffracts / bends at the edges of objects. (Ref. 1665- **Grimaldi**)

God can't be proved; so wager He exists 1670 Religion: Pascal (ref. 1654), in *Pensees / Thoughts*, collected by friends and published after he died (1662), wrote, "There are two essential religious truths; there is a God, and there is corruption of nature which makes people unworthy of God." He said that one could not "prove" that God exists using reason. So, *should* one believe in God? He reasoned, "Belief is a wise wager. Granted that faith cannot be proved, what harm will come if you gamble it's true and it proves false? If you win, you gain all (Heaven); if He *doesn't* exist, you lose nothing. Wager, then without hesitation, that He exists." This argument fails as one can't *choose to believe* something one is unsure about. And it applies equally to any god. One can believe, of course, but it must come from within. **Diderot**, a *philosophe*, a century later said, "An imam could reason the same way."

Pascal Quotes

Catholic fear of dissent: Jesuit priest **Lewis le Compte**, a missionary to China, said the Chinese had practiced Christian virtues for 2000 years. U of Paris Catholic clerics condemned him.

c.1670+ **Baruch Spinoza** Philosophy: Baruch Spinoza/Benedictus de Spinoza (1632-77), Dutch, was one of the great rationalists of 17th century philosophy. **Bertrand Russell** later said that he was the "most lovable of the great philosophers." **Spinoza** helped pave the way to *the Enlightenment* and modern biblical

criticism. In 1656, at 24, without stating reasons, his synagogue in Amsterdam put him in herem. (excommunication) They offered him 1,000 florins per year to conceal his opinions. He declined.

Religion is organized superstition

Theology: **Spinoza's** 1670 *Treatise on Theology and Politics* /*Theologico* opened with, Religion "is organized superstition." It was influenced by **Maimonides**. It was published anonymously to protect him from political retribution. He wrote it in New Latin rather than the vernacular Dutch to avoid censorship by the secular Dutch authorities.

Theology's goal is obedience.

In *Treatise*, **Spinoza** put forth his most systematic critique of Judaism and all organized religion. He argued that theology and philosophy must be kept separate, particularly in the reading of scripture. As the goal of theology is obedience, but philosophy aims at understanding rational truth. Scripture does not teach philosophy and thus cannot be made to conform with it.

Philosophy's goal is truth.

Conversely, if reason is made subservient to scripture, then "the prejudices of a common people of long ago . . . will gain a hold on his understanding and darken it." He turned down a professorship at Heidelberg. "I do not know how to teach philosophy without becoming a disturber of the peace." "The more you struggle to live, the less you live. Give up the notion that you must be sure of what you are doing. Instead, surrender to what is real within you, for that alone is sure. You are above everything distressing." His study of the *Bible* told him it was merely a collection of different stories of different writers, not divinely inspired (See 1673, '77)

c.1670 **Philosophy: George Seville**, Marquess of Halifax (1633-95), said, "They who believe that money will do everything, may well be suspected to do everything for money."

1671 **Fossils Geology: Nicolas Steno** (1638-86), Dane, a founder of modern geology, wrote *Concerning Solids Within Solids*. Said fossils were once living organisms left in softer materials which hardened.

1671 **Fear of learning: King Louis 14** (1638-1715), banned lectures of **Descartes'** ideas (He had died in 1650.).

1671 **Astronomy: Ole Roemer** (1644-1710), Dane, and **Jean Picard** observed about 140 eclipses of Jupiter's moon *Io* from the island of Hven (the former island of **Tycho Brahe**).

1672 **Roemer** went to Paris as assistant to **Giovanni Cassini**, director of the Paris Observatory. He added his observations to **Cassini's** and observed that times between eclipses (particularly those of *Io*, the innermost of Jupiter's four moons) got shorter as Earth approached Jupiter, and longer as Earth moved farther away. He measured light reflected off Jupiter when Jupiter was closest to Earth and furthest away. **Cassini** had earlier observed the same eclipses. **Roemer** wrote that this apparent anomalous behavior of the eclipses could be accounted by a *finite* speed of light (**Aristotle** and **Kepler** thought light speed was infinite.)

1672 **Astronomy: Jean Richer** in Cayenne, South America, and **Cassini** in Paris calculated somewhat accurately the distance to Mars by triangulation between Paris, Cayenne, and Mars.

Sunlight

Physics, Optics: Newton gave his first scientific paper to *the Royal Society*, saying light was particles and that sunlight was a blending of all colors. This contradicted the common opinion that sunlight was one color. He said that **Grimaldi's** diffraction (1665) was only a new kind of refraction; that the laws of reflection and refraction could only be explained if light is made of particles/corpuscles, as waves don't travel in straight lines.

Hooke and **Huygens** (ref.1656) criticized this. **Newton** refuted their criticisms.

1672 **Philosophy: Samuel Pufendorf** (1632-94), German philosopher and jurist: "Man has an innate spark of divine reason letting him understand nature's governing laws, including moral laws, without which no community is possible. When one realizes that his self-interest requires him to treat others as himself, he is ready to live among others."

Microbiology

1672-1723 **Biology, Microbiology: Antonie van Leeuwenhoek** (1632-1723), Dutch, an unlettered but well self-educated linen draper, began modern biology when he discovered the cell.(**Hooke**) He built a 275 power microscope. He kept secret how he made it. He saw his own blood cells. He reported

this with drawings to the *Royal Society*. Importantly, he was the first to see micro-organisms.

Over 50 years he sent the *Royal Society* (He was made a member in 1680) and the *French Academy* over 500 reports with exquisite drawings of almost everything that could be examined by microscope. In all living matter, he saw cells, the building block of life, and other micro-organisms. He saw and described blood cells, spermatozoa (1677), single-celled organisms like bacteria (1683), and swimming protozoans, *animalcules*. His work became the basis of bacteriology and microbiology and made biologists aware of the vast variety of microscopic life.

His microscope was a droplet of glass Even though cells consist of trillions of atoms, they are still far too small to be seen with the naked eye. Ten million would cover a pinhead. For 50 years, due to his secret microscope, he had a monopoly on microbiology. He never sought wealth. His secret was his lens which was merely a droplet of molten glass. Incredibly, no one else had thought of this.

Unfortunately, after **Leeuwenhoek** died, interest in microbes faded and was not revived until the 1820s. The next major discovery re cells was how they multiply. (See 1845-**Remak**).

1673 **On Human Bondage** Philosophy: Spinoza (ref.1670) privately circulated his essay, *On Human Bondage*. He argued that we are only a prisoner of religion or the state if we thought we were. A sensible mystic, **Spinoza** constructed the world's first thoroughly logical, consistent metaphysical system and made the first attempt at an objective, scientific study of human behavior. (see 1677)

He doubted the divine nature of those laws that were simply common sense health rules for Jews, i.e., eat no pork. They were valid as they promoted the well being of the community, but not divine.

1674 **Locke: Religion is private. Not "every member"** Political Theory: John Locke (ref 1669). His *On the Difference Between Civil and Ecclesiastical Power* said, "The purpose of the church was to obtain happiness after this life in another world, whereas the purpose of the state was "civil peace and prosperity, or the preservation of society and "every" member thereof in a free and peaceful enjoyment of all the good things of this life." But, not really "every" member. What **Locke** really meant was "every free white property-owning Christian male member." (The prevailing British Christian attitude was anti-Catholic. More **Locke** 1688-89,'97)

Physics, optics: Newton's Hypothesis of Light said that light consisted of particles/corpuscles emitted in all directions from a source. **Newton** wrote **Hooke**, "If I have seen farther than others, it is by standing on the shoulders of giants." He said this to ridicule **Hooke**, who was short and deformed.

1675 Astronomy: Greenwich Observatory / London) was built to measure the movements of the planets. Greenwich was agreed as zero *longitude*, which greatly helped sea navigation. (See 1761-**Harrison**)

1676 **Roemer** Physics, speed of light: Roemer (ref. 1672-3) told the French *Academy* that the speed of light was finite. **Cassini** (see 1672) incorrectly criticized it. **Roemer** returned to Denmark, had a long and distinguished career. Using **Roemer's** method, **Huygens** (ref. 1656) said light went 144,000 mps (low by 29%).

1677 **Spinoza** Ethics: Spinoza's Ethics and all other works (except *Principles of Philosophy* and the *Theologico-Political Treatise*, ref. 1670), were published after his death. A determinist, he applied Cartesian theory to philosophy and ethics; it replaced **Descartes's** "I think, therefore I exist" with "Love your neighbor and perfect your reason." He said, "man is a social animal. . . The highest activity a human being can attain is learning for understanding, because to understand is to be free."

On the Improvement of Understanding **Spinoza's** ethical beliefs were Epicurean, in denying ethics beyond the material world, although Epicureans focused more on physical pleasure and **Spinoza** more on emotional well being. His *Treatise on the Improvement of Understanding / Tractatus de intellectus emendatione*) gave the core of his ethical philosophy, that good and evil are relative concepts, nothing is intrinsically good or bad except relative to a particularity. Things seen as good or evil were simply good or evil for humans.

Spinoza did not want the common people to read his ideas as it would upset their prejudices. So he wrote in Latin. He followed **Hobbes** in subjecting the *Bible* to reasoned textual study and examination.

Most effective attack on Christian supernaturalism 1677 **Spinoza's** 1670 *Treatise on Theology* was the most effective attack on Christian supernaturalism printed. It criticized "opportunistic preachers" who play on people's hopes and fears in the face of a judging God." He also showed that **Moses** could not have written the *Pentateuch* in the form then written. In hindsight this was obvious. All scholars now agree. *Treatise* was put on the *Index*, so Catholics could not read or even discuss it. He rejected being called an atheist. He challenged the fundamentals of revealed religion, received ideas, tradition, morality, and the divine authority of kings.

No such thing as free will. Free Will?: **Spinoza** said, "There is no such thing as *free will*. He asked, "Is a will free when exercising it may doom one to eternal torture?" "The mind is induced to wish this or that by some cause, and that cause is determined by another cause, and so forth back to infinity." He 1677 said, "Avarice, ambition, lust, etc, are species of madness." "The chief end of human society is freedom, individual liberty." Happiness is the rational understanding of life and the world." Also, "A god that *demand*s worship is not *worthy* of worship." So Christians and Jews both disliked him.

Social Contract Spinoza Quotes **Spinoza's** politics: He agreed with **Hobbes** that what is called a "natural right" is simply power. "Man has as much right as he has might." "People are necessarily motivated by self-interest, and the state is based on a social contract to secure individual interests, especially security." "The power of the state is the price people pay for order and security." "The state should enhance one's chance of self-fulfilment." "Obedience to a sovereign does not impinge on one's freedom as they had willingly ceded to that sovereign the power to rule justly (social contract)."

Democracy Political Theory, democracy: Democracy is the type of government most likely to respect and preserve Man's autonomy, issue laws based on sound reason, and serve the ends for which governments were instituted. The most tyrannical of governments are those which make crimes of opinions [Christianity and Islam do so] for everyone has a right to his thoughts.

Problem of suffering Regarding *The Problem of Suffering / Evil*, **Spinoza** said, as everything is part of one reality, there is no such thing as evil. What we see as evil is only so as we lack the understanding to see the bigger picture. (Man-has-limited-ability theory.) **Hume** in 1739 disagreed, said that **Evil doesn't exist** idea was contrary to common sense. *Evil* might not be real, but suffering surely is.

Spinoza: "Philosophy has no end in view save truth. Faith looks for nothing but obedience and piety." Like **Anselm** and **Descartes**, he posited an *Ontological Argument* for God, but his God was nature. He was a lens grinder. He gave his inheritance to his sister and believed that men were naturally superior to women.

Einstein liked **Spinoza**, "I am fascinated by **Spinoza's** Pantheism. I admire even more his contributions to modern thought. **Spinoza** is the greatest of modern philosophers, because he is the first philosopher who deals with the soul and the body as one, not as two separate things."

God reveals himself through nature. He inspired the Enlightenment For **Spinoza**, God reveals himself through nature. The highest virtue of the mind was to know God (an infinite being). One worshiped God by learning. He inspired the *Enlightenment*, contra to the more moderate *Enlightens* of **Voltaire**. The *Enlightenment's* ideas came from him. He said religion had not advanced the species. Reason could. Happiness comes not from material goods or in blind attachment to the superstitions of religions but from a life of reason.

Bunyan was jailed for preaching without a license. 1678 Parliament's control: **John Bunyan** (1628-88) Brit, *Pilgrim's Progress* is a Christian allegory. **Bunyan** was arrested and jailed several times for unlicensed preaching, during which he wrote *Pilgrim's Progress*. The hero, Christian, dressed in rags, goes through life meeting crises. He encounters the Slough of Despond, Hill Difficulty, the Valley of Humiliation, and Vanity Fair.

The book spoke to every human Christian overcomes the difficulties walking over the Delectable Mountain and through the Enchanted Ground and across the River of Death and is finally prepared to view and enter the Celestial City. The men and women in the book are flesh and blood. Christian is everyman. It was the most published English book for two centuries. Every character represents something. Protestant Christianity represented Truth, necessary for mankind to survive.

1678 Astronomy: **Edmund Halley** (ref. 1662-3 , '65-66), a friend of **Newton**, identified 341 stars visible only

from the Southern Hemisphere, earning membership in the *Royal Society*. (more 1684, '86-87, 1708)

1680 Lord **Robert Estrange**, Brit, *Licensor of the Press*, Newspapers make the masses too familiar with the
London councils of their superiors, and gives them. . . a colorable right. . .to be meddling with the government."

1681 Philosophy: **William Penn** (1544-1718), received a royal deed from **Charles 2** and founded the colony of Pennsylvania for all religions. Many Germans and Scots-Irish settled there. He said, "Inquiry is human; blind obedience is brutal. Truth never loses by the one but often suffers by the other."

1682 Catholicism: A comet was seen over Europe. **Innocent 11** ordered church bells across Europe rung to scare it away. After several weeks, It went away. **Innocent** claimed victory.

Thoughts on the comet of 1682. The first all-out defense of the morality of atheism. Philosophy: **Pierre Bayle** (1647-1706), Calvinist, French, chairman of philosophy at the Protestant University at Sedan (Northeast France) until the government suppressed it. He moved to the more intellectually open Rotterdam, where he became a professor of philosophy and a leading member of the intellectual community. He wrote *Miscellaneous Thoughts on the Comet of 1682*. It was the first all-out defense of the morality of atheism and historical atheists. He said philosophy and theology must be separate as theological doctrines couldn't be defended by reason and thus were solely matters of faith. (more **Bayle** 1685, '87, '97, 1700)

1682 Botany: **Nehemiah Grew** (1641-1712) Brit. His *Anatomy of Plants* posited that plants reproduced sexually, that individual grains of pollen were the equivalent of the sperm of animals. (More 1694)

1673-83 Math: **Newton** lectured on algebra and the theory of equations. His notes were published in 1707.
Isaac Newton He explained the mathematical theory on tides gravitationally attracted by the Sun and Moon. He estimated light's speed at 16.6 Earth diameters/sec, low by c29%. He said that, due to centrifugal force; the Earth was not a perfect sphere but bulged at the Equator. (Verified in 1735)

1684 Philosophy: **Descartes's Rules for the Direction of the Mind**, reasoning, published in Holland 34 years after he died. 1. Accept no statement unless it was clear and distinct and based on good evidence. 2. Divide any problem into as many elementary parts as possible, resolve each one. *Reductionism*. 3. Start with the simplest ideas and move toward the more complicated ones. 4. Review each step frequently to ensure nothing is left out. Record all steps completely and clearly.

That is, reduce a problem to mathematical forms. Use the fewest number of self-evident propositions, axioms, to shape it, use analytic geometry (which **Descartes** invented for this), further reduce the description of the problem to numbers; use algebra, solve the equation.

This method was less empirical than **Francis Bacon's** and contrary to **Locke's** 1689 *tabula rasa* theory and likely influenced **Kant's** similar theory of *a priori* knowledge of 1755. **Descartes** felt the mind had certain *inherent* attributes / capabilities which enabled men to make sense of phenomena.

1684 Astronomy: **Giovanni Borelli**, Italian astronomer, **Hooke**, **Christopher Wren**, architect, astronomer, and **Edmund Halley**, all tried to know what kept the planets (Mercury, Earth, Mars, etc.) orbiting the Sun. They thought the Sun exerted some attractive force. They were right of course as in three years **Newton** explained the scope of gravity in his *Principia*. Most scientists at the time correctly believed that such force diminished as the distance between the Sun and the planet increased.

De Motu: Planets' orbits of the Sun are elliptical **Halley** asked **Newton** what curve would be made by the planets around the Sun assuming the force of attraction towards the Sun was the inverse of the square of their separation. **Newton** told him that he had *calculated* that such orbits were elliptical in 1666, but hadn't published it. **Halley** urged him to publish it. So, later in 1684 **Newton** sent a study of **Kepler's** laws titled *De Motu corporum in gyrum* to the *Royal Society* to register the priority of his ideas and worked on a more complete explanation of his ideas. (Don't confuse with **Galileo's De Motu**.)

De Motu showed that a central force was a necessary and sufficient condition for the law of areas, and that an elliptical orbit implied that the force varied as the inverse *square* of the separation.

Also, planetary orbits were not *precisely* elliptical due to gravity with the Sun's other planets.

Such modification to **Kepler's** laws showed the difference between the mathematical accuracy /purity of **Kepler's** laws and the physical reality where there were many masses with gravity, planets interacting.

Newton: God does the math This distinction was a revolutionary feature of **Newton's** celestial dynamics. *De Motu* said that calculating the forces governing the planets' orbits and their gravitational attraction to one another exceeded man's ability. He said that a higher intellect, a God who created the universe, was needed to ensure the stability of the solar system. Such confession was uncharacteristic of **Newton**. (In 1799, **Laplace** showed that the solar system *mathematically* followed **Newton's** laws of motion and gravity.)

1685 King **Louis 14** (ref. 1671) revoked the tolerant 1598 *Edict of Nantes*, foolishly saying that as there were no Protestants left; it wasn't needed. **Bayle** (ref. 1680), safely in Holland, said that the revocation was "grotesque intolerance based on moral and logical absurdity." (more 1687, '97)

Newton, Principia: **Newton** gave *Book One* of his *Philosophiae Naturalis Principia Mathematica* / *Mathematical Principles of Natural Philosophy* (a/k/a *Principia*), his work on motion and gravity, to the *Royal Society*. It discussed the motion of bodies in unresisting mediums.

1686 **Why should there be any world at all?** Baron **Gottfried Wilhelm von Leibniz** (1646-1716), German, a great continental rationalist, was a prolific writer and great intellect. He wrote learned essays on many subjects. He was elected to the *Royal Society* at 27. He discovered calculus at about the same time as **Newton**.

Why should there be something? **Leibniz** wrote in Latin or French. *His Discourse on Metaphysics* asked why should there be any world at all? (He asked it again in 1714). **Martin Heidegger** said it's "the fundamental question of metaphysics." (Answer at 2012-Cosmology-Krauss and on p. 414-Krauss).

Denis Diderot, no admirer of **Leibniz's** views, said of him in *the Encyclopedie*, "Perhaps never has a man read as much, studied as much, meditated more, and written more than **Leibniz**. (more **Leibniz** 1700, '03-4, '10, '14, '35).

A Plurality of Worlds. Ideas of *the Enlightenment* were spread by popular books, such as **Bernard de Fontenelle's** *A Plurality of Worlds* which discussed *heliocentrism*, and by books about different cultures, which let persons question the superiority of their own culture, and by **Locke's** (1689) notion that the human mind at birth was a blank slate. **Richard Tarnas**, *The Passion of the Western Mind*, "**Locke** set the tone for the *Enlightenment* by affirming the foundational principle of empiricism." Previously, logic had been used in law and to aid theology.

The Enlightenment was limited to very few educated scholars.

Enlightenment ideas spread: Learned academies like *The French Academy of Science*, *The Royal Society* of London, the book industry, scientific and literary journals, the "Grub Street Hacks," coffee houses, debating societies, and Freemason lodges, all disseminated *Enlightenment* ideas. Cambridge and Oxford played little role. They taught mainly classics.

1686-90 **Edmond Halley** *Natural Philosophy:* **Edmund Halley** (ref. 1662-3, 1678, '84) said uneven solar heat on Earth caused atmospheric motions and discovered that barometric pressure was lower at higher altitudes (that is, the weight or mass of air above any given area decreased with altitude.)

In 1690, he built a diving bell and a liquid-filled magnetic compass. He didn't get a post in astronomy at Oxford due to his atheism, as only Anglicans could attend or teach at Oxford or Cambridge, England's only universities until 1826. Peers got a diploma without examination.

In contrast, Scotland then had four universities and many discussion clubs.

In Catholic Ireland, Trinity College, Dublin, ...founded in 1592, did not admit Catholics until 1793.

1687 **Principia was a turning point in intellectual and scientific history** *Principia:* **Newton** published, in Latin, his 3 books of *Philosophiae Naturalis Principia Mathematica*. It was an immediate sensation. It marked the beginning of modern science. *Principia* advanced the understanding of the physical universe. It was a turning point in intellectual and scientific history.

Book 1 dealt with bodies' motion in free space. His laws of motion validated the concept of an ordered universe understandable to the human mind. He merged force and motion.

It described the principles of calculus, which he had significantly developed.

Book 2 dealt with bodies in resisting mediums, hydrodynamics, with some errors.

Book 3, The System of the World, described gravity and how it affected the solar system.

Newton Physics was then the only truly mature science. Like **Descartes**, *Principia* rejected some

Aristotelian principles. *Principia* distinguished weight (gravitational attraction) from mass. (Ref.1666-**Boyle**). **Edmund Halley** (ref. 1678, '84, '87), not a wealthy man, paid to publish *Principia*. **Newton** expressed his ideas and demonstrated his calculus as theorems in the Greek Euclidian geometry rather than in the new analytical mathematics of the 17th century.

Newton Geometry was better known but unsuitable to account for the more subtle higher-order effects of actions between the planets. **Newton** favored calculus. **Newton** later said that he had made *Principia* unreadable to avoid being "baited by little smatterers in mathematics." It made **Newton** famous. It was one of his few science writings.

Newton deduced gravity's inverse squared force from Kepler's Third law *Principia* 3, gravity, the basis of the Newtonian revolution in science. Namely, every bit of mass in the universe attracts every other bit of mass. with a force proportional to the product of their masses and inversely proportional to the *square* of their separation. **Newton** deduced the inverse square attractive force of gravity from **Kepler's** laws of planetary motion. This meant, *inter alia*, that every planet has a gravitational attraction towards the much larger mass of the Sun (and of course, vice versa), which attraction diminishes as to the square of the distance to the Sun. He said, "Nature is pleased with simplicity."

1687 **Newton** acknowledged that **Hooke**, **Halley**, and **Christopher Wren** accepted the inverse square ratio concept of the strength of gravity, but he had shown its accuracy. The reality of gravity did in the *Medieval* view of the world as a structure moved by an unseen but ever-present God.

Newton thought of nature in terms of forces between objects. In *Principia* 2, he wrote, "A God without dominion, providence, or final causes, is nothing but Fate and Nature."

Motion can be calculated by math. *Principia* showed that the motion of an object is a *mathematical* relation of all the forces that act on it, like gravity and friction. Physicists then looked for other laws of nature to explain natural phenomena.

Hooke claimed that **Newton** had gotten the idea of gravity from him, a dispute that astronomer **Alexis Clairaut** a century later described as the distance between a truth that is glimpsed and a truth that is demonstrated.

Newton calculated the speed of sound at 15% under current knowledge.

Newton's three laws of Motion. *Principia* described **Newton's Three Laws of Motion** (which he had formed 20 years earlier):
1. *Inertia*: Every object stays at rest (or in motion in a straight line as the case may be) unless another force [like friction, gravity or another object] acts on it. (ref. **Mo-tzu** (450 BC),

Philoponus (549), **al-Haytham** and **Avicenna** (c.1000), **Ockham** (1331), **Galileo** (1633), **Descartes** (1644), and **Hooke** (1665) all contributed to developing inertia). **Aristotle** had said being at rest was matter's natural state. This first law is a subset of the second law.

2. Conservation of linear momentum *Momentum*: A moving object has *linear momentum*, mass times velocity (speed in a specific direction). A change in an object's motion (acceleration, deceleration or direction or a combination) is proportional to the force put on it and occurs in the direction of that force, i.e., force divided by mass = acceleration, $a = F / m$. Or, force = mass times acceleration. $F = Ma$.

(Mass x velocity) Velocity is a rate of change/speed in a specific direction. So, two identical objects can have the same speed but a different *velocity*. Velocity or speed is a rate of change of location relative to a measuring point, which is most commonly the Earth.

1687 Acceleration is the rate of change of a rate of change.

[On Earth, gravity causes a falling object to accelerate toward Earth at c.32 feet /sec/ sec.]

This law is effectively the law of conservation of energy (the capacity to do work). (See 1847)

3. Action-Reaction. *The conservation of linear momentum*: "When one body exerts a force on a second body, the second body simultaneously exerts a force equal in magnitude and opposite in direction on the first body." A/k/a For every action, there's an equal and opposite reaction. Shoot a gun; bullet goes forward, gun goes backward, the linear momentum of the bullet and the gun are equal in force but in opposite directions, the total linear momentum of gun and bullet stays the same.

Newton **Descartes** (1637) and **John Wallis** (1670) had previously described the *law of conservation of linear momentum*. As the gun has much more mass than the bullet, the bullet moves farther and faster than the gun. Total momentum of a system is only changed by an outside force acting on it. Two identical balls rolling at the same *speed* but in different directions have different momenta as one of momentum's components, velocity, implies a specific direction.

Newton said a cannonball shot horizontally would orbit the Earth if shot fast enough.

Angular momentum Angular (as opposed to linear) momentum is the force of a spinning body (like a flywheel) and is guided by the same principles. It was studied in the 18th century. (1736-**Euler**).

Avicenna and **Huygens** had written this law in quadratic form. **Newton** reformulated it..

Significance Physics: *Principia* validated the concept of an ordered universe. The laws of motion established the science of mechanics and ordered the orbits of the planets.

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Kepler had based his *Rules of Planetary Motion* on observation and measurement.

Newton explained them with his *Laws of Motion* and his *Law of Gravitation*. **Newton** published Earth's gravitational attraction to the Moon, which he had calculated in 1666.

Principia unified **Galileo's** physical mechanics and **Kepler** and **Copernicus's** celestial mechanics.

Absolute time and space **Newton's** mechanics needed a specific time and place from which to measure the motion of an object. So **Newton** postulated an absolute space and an absolute time for the forces and movements in nature to be measured from. Absolute time just flows uniformly on without

1687 regard to anything external. (see 1905-**Einstein** regarding space-time). *Principia* discussed tides, comets, the theory of limits, conical sections, orbits of planets and their satellites, the laws of curved motions, pendulums, how to analyze wave motions, and other matters.

Relationship of Newton's laws to the laws of conservation Relationship of **Newton's** Laws to the conservation laws: In modern physics, the laws of energy, conservation of momentum, and angular momentum are valid for more situations than **Newton's** laws, as they apply to both light and matter, and to both classical and non-classical physics.

This can be stated simply, "Momentum, energy and angular momentum cannot be created or destroyed." Because force is the time derivative of momentum, the concept of force is redundant and subordinate to the conservation of momentum, and is not necessary or used in fundamental theories, e.g., quantum mechanics, quantum electrodynamics, general relativity, etc.)

Newton's Rules of Reason In Book 3, *Principia* laid out four rules of reasoning. 1. Accept the simplest valid explanation of an event. (**Ockham's** razor: Cut away the irrelevant. The more complex an argument, the more likely there will be logical fallacies, rhetorical tricks, good sounding but false premises.)

Order in Nature 2. As far as possible, assign the same natural causes to the same natural effects i.e., breathing in humans and animals, stones in England or Iceland. That is, there is order in nature, Uniformitarianism.

3. Qualities of objects in an experiment are the universal qualities of all bodies whatsoever. Also citing order in nature. All matter is affected by gravity, even light rays, as they have mass.

Trust Induction 4. **Newton's** most important rule, accept conclusions from Induction as accurate (or close to it) notwithstanding any contrary hypothesis, until other observed facts / premises make them more

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accurate or liable to exception. That is, a conclusion based on the regularity of Nature, an experiment, observed & measured, outweighs any mere hypothesis, however reasonable it sounds.

Catholic univ's ignored Principia for a century *Principia*: Despite its cumbersome writing style, *Principia* spread swiftly among the educated class (those who spoke Latin). It was only first translated into English in 1727 (40 years after it was first issued in 1687). In a century, 18 editions of *Principia* were needed and 73 books were written about it, in English, French, German, Portuguese, and Italian. Oxford and Cambridge, however, took 12 years to teach it. Catholic universities did not teach it for over a century.

Newton

Principia validated Science. Machina Mundi *Principia* was the start and became the foundation of physics for 200 years, now known as classical physics, *Machina mundi*, the world as a machine. The universe is a giant mechanism that operates in orderly and predictable ways. **Newton** applied the laws of motion to planets.

Principia showed how **Descartes**, **Galileo**, **Kepler**, **Huygens**, and **Hooke** erred.

Newton said **Descartes's** notion of vortices led to a confusion of celestial motion.

Principia didn't discuss energy, the capacity to do work But Newtonian physics did not fully explain what kept the universe running. Namely, energy. Energy ("E") is defined as the capacity of a physical system to do mechanical work. Energy cannot be created or destroyed, only transformed. Work is transforming energy from one form to another.

When energy is transformed in a closed system the total amount of energy remains constant.

This is the *Law of the Conservation of Energy / the First law of Thermodynamics*. (modified in 1905. See-1905-mass-energy **Einstein**)

(**Leibniz** dealt with the concept of energy in 1710; he called it *vis viva* / life force.) (See 1701-Energy)

Newton **Newton** never used the word energy and died 76 years before **Thomas Young** (1773-1829),

never mentioned energy	Brit, <u>used the term in 1803</u>. Newton's stunningly simple <i>Laws of Motion, Gravity, and Rules for Reasoning</i> <u>validated mathematics and science as the key to understanding all existence</u>. <u>His rigorous and logical approach to science, destroyed the idea that the universe was governed by capacious gods who determined the fall of an apple or the motion of a star at their whim. He replaced this with a universe running in accordance with predetermined inviolable physical laws.</u>
1687 The modern pluralistic age of intellect	Aristotle and Descartes had advocated <i>deducing</i> scientific laws from universal premises (presumably accurate and valid). Francis Bacon (1600) had, like Newton after him, advocated <i>Induction</i>. Newton combined the two. He <u>used <i>Induction</i> to reach general principles and then used <i>deduction</i> to reach further deductions that would be verified by precise measurement and observation</u>. William McNeill: Descartes, Hobbes, Spinoza, and Newton began "<u>the modern pluralistic age of intellect</u>."
Scientific Method	Newton <u>hated hypotheses</u>, explanations not directly supported by experiment. The <i>scientific method</i> is not a rigid set of rules, it is simply appropriate procedures to verify or falsify a scientific hypothesis. The procedures depend on the hypothesis being examined.
Newton	Newton's scientific method <u>had three characteristics</u>: 1. Scientists are objective (or try to be). 2. Science deals with real measurable things, not feelings; that is, <i>is</i> and <i>are</i>, not <i>should</i> and <i>if</i>, and 3. Science advances through repeatable, verifiable experiments to prove / disprove a hypothesis.
1687 Newton. Natural laws replaced divine explanations of events. Catholic schools ignored natural laws.	<u>Natural law</u> explanations replaced <i>divine</i> explanations of events. Scientific knowledge prevailed as it can predict and it can be verified. <i>Heliocentrism</i> supplanted <i>geocentrism</i> as it was more accurate and could and did predict new observations such as the phases of Venus and the orbits of comets. <u>The scientific method validated the new advances in science, as opposed to "knowledge" from priests</u>. Francis Bacon, not a scientist, and Descartes were the two main codifiers of the new way of acquiring knowledge. The <i>scientific method</i> does not automatically rule out supernatural beliefs. It simply tests them for adequate evidence (like experiments) and the beliefs are thus verified or refuted and discarded. Scientific method procedures developed incrementally as needed from Thales to Newton.
Science does not explain events. It describes them	Newton's universe was an eminently common-sense place. <i>Principia</i> welded Newton's and Galileo's ideas on forces. Newton wrote <i>geometric</i> equations describing planets' orbits. <u>Science does not explain physical phenomena (like gravity), it merely describes them</u>. Niels Bohr later said <u>physics's job is not to say what Nature is, but what we can say about it</u>. <u>An explanation would give the purpose of an event</u>. Natural events have no <i>purpose</i>. Science, the discovery of the natural laws that govern <i>how</i> stuff happens, let people predict phenomena.
1687 Newton	Despite <i>Principia</i>, Newton, as a Unitarian (didn't accept the Trinity), so couldn't become a parson, so couldn't advance at Cambridge, mired in Anglican dogma, so he left. He became Master of the Mint in London and in 1703 president of the <i>Royal Society</i>. He spent the rest of his life in politics, academic and otherwise. He was the most respected scientist since Aristotle. Newton also wrote over a million words on <u>theology, the occult, and alchemy</u>. He believed the text of the <i>Bible</i> contained codes. <u>These writings have been rightly forgotten</u>.
The Scientific Revolution helped people understand nature.	The modern <i>scientific revolution</i> can roughly be dated from Vesalius (1543-Anatomy) and Copernicus (1543-heliocentrism) to Newton (1687-classical physics). <u>They fundamentally and for all time transformed Man's understanding of nature and led to relativity and quantum theories</u>. The principles and procedures of <i>the scientific method</i> showed the error of some of Aristotle's ideas (ref. 335 BC), which were based on logic and intuition rather than experiment and measurement, as well as the errors of various <i>biblical</i> statements about the natural world.
Second key for new discoveries. new tools to measure	The second essential key to new discoveries in science was <u>new measuring tools</u>, thermometer (1592), microscope (1597), telescope (1608), barometer (1643), pendulum clock (1657), chronometer (1761). The telescope released man's imagination as no other implement had ever done. (The weight balance scale had been used for millennia.)
Newton	We take order and measurement of the physical world for granted. It was not always so. Persons learned to measure, explain, and manipulate natural phenomena in a way we consider scientific. While the Christian religions were fighting each other, <i>Principia Mathematica</i> established itself.
Newton	<u>Belief in the truths of science is one of the key elements of modern thought</u>. Science from 1680-

-1730 was dominated by **Newton**, and to a lesser extent, **Leibniz**, who said, “**Newton** robbed the deity of some of His most excellent attributes and sapped the foundation of natural religion.

The five simple ancient machines The five simple machines, 1. lever, 2. wedge, 3. wheel/axle, 4. pulley, and 5. screw, were ancient, and had been modified, combined into more complicated machines, and improved over the centuries. But, due to **Newton**, **Descartes**, **Galileo**, **Euclid**, and others, scientists realized *how* machines worked, and began to see ways to make them work better. **Euclid's Geometry** was well known only in the West. It was the important basis for much of the work of Western scientists.

Fear of dissent Science became the model for knowledge about humans and society, as well as the basis for knowledge about nature. Newtonian physics was the culminating event of the new science. Theology became a rearguard action against the juggernaut of reason. Christians attacked **Newton** for “dethroning God.” The usual response of an ignorant believer.

1687 Political Theory: Parliament granted religious freedom to all and legalized missing the Anglican Mass.

1687 **Bayle's** (ref.1680, 85)*Commentaire philosophique*, a classic of toleration, influenced **Locke** (1688).

1688 **Alexander Pope**: “Nature’s Laws lay hid in Night; God said, Let **Newton** be; and all was Light.”

Malebranche answer to The Problem of Suffering Theology: **Nicolas Malebranche** (1638-1715), French priest, proposed an answer to *The Problem of Suffering* /*Evil*. Like most others, he *assumed* a God existed and used that to prove a God existed. He said God could have created a perfect world but didn't to get the best balance between perfection and the simplicity and generality of its laws.

For **Malebranche**, evils and sufferings prove that God did not seek to create the best of all possible worlds but only the best possible world for God's ways.

God causes everything **Malebranche** is known principally for offering the first synthesis of **Augustine** and **Descartes**. Two distinctive results of this synthesis are his doctrine that we see bodies through ideas in God and his *occasionalist* conclusion, namely that God is the only real true cause of everything. If one strikes a match, God causes the match to light. (Like **Ghazali** 1085.)

God is perfect He described God, “He is a being infinitely perfect-of this we cannot doubt. . .So neither ought we to imagine that that the spirit of God has human ideas or bears any resemblance to our spirit, under color that we know nothing more perfect than the human mind. . .his true name is “He that is” . . .All being, the being infinite and universal.”

c.1688 **John Locke returned to England from exile** Political Theory, **John Locke** (ref. 1670) the “Glorious Revolution”: Parliament ousted King **James 2** and offered the throne to **William of Orange**, Dutch, Protestant, and his English wife **Mary**, daughter of **James 2**. **Locke**, living in exile in Holland as **Van de Linden** with the Earl of **Shaftesbury**, came back to England with **Mary** and with *Two Treatises on Civil Government*, which he probably wrote while in **Shaftesbury's** employ from 1667-75, but were not published (In 1669, **Locke** wrote a slavery constitution for a slave colony and profited from the slave trade.)

1689 **Locke** was not the wisest but was the most influential English philosopher. (That was **Hume**). **Locke** founded philosophical liberalism (except for slaves, women, and the poor) as much as of empiricism, and in the theory of knowledge. **Locke** saw a great *Chain of Being*, humans at the top, created by God.

Locke disputed Hobbes Religious tolerance had been much debated in Holland during **Locke's** stay (In 1685, **Louis 14** had revoked the *Edict of Nantes* that had guaranteed religious toleration for French Protestants.) As a founder of empiricism, **Locke's** philosophy was contrary to **Hobbes's** in *Leviathan* (1651). **Hobbes** had said that the having just one religion was the key to a well-functioning civil society.

Locke's limited “toleration” A friend of **Locke** published **Locke's A Letter on Toleration** anonymously. It argued that religious differences had to change. He disputed **Luther's** harsh edicts. “God is tolerant, you don't have to kill other faiths.” **Locke** said tolerate other Protestant sects, but not Catholics or atheists.

He argued that more religious groups actually prevent civil unrest, as civil unrest results from government attempts to prevent different religions from being practiced. That is, permit different religions to do their thing as long as it did not threaten the civil government.

He said that toleration of other faiths is the only true Christianity. (except for Catholicism of course). In 1695, he wrote *The Reasonableness of Christianity, as Delivered in the Scriptures*.

1689 **Locke's** primary goal was to keep religion out of the business of civil government.

That is, government's role was to promote external interests, relating to life, liberty, and the general welfare, while the church existed to promote personal interests, salvation.

He said the only way to gain genuine converts is through persuasion, not force.

Religions devastated Europe

He must have forgotten Europe's devastation by its "wars of religion." The Catholic Church had tortured and killed "heretics" in *Inquisitions* and crusades. **Locke** said that Europe's devastation only occurred due to Catholics' corruption and greed. He erred. Both sides were at fault.

Locke: "Officials should concern themselves only with civil interests. Officialdom has no business regarding inward things-our beliefs, our views, [how] we worship." (**Jefferson** said the same, 1810)

Locke's hypocrisy.

Locke's "toleration," was limited and hypocritical. He supported slavery, profited from the slave trade, and said that atheists and Catholics (the French and the Irish) should be legislated against as inimical to religion (his religion of course, Anglican) and the state.

Natural rights are for rich men only. Women and the poor shouldn't be citizens.

Locke's hypocrisy: His "natural rights" were only for rich white men, not for women, Blacks, Catholics, Dissenters, slaves, poor people, orphans, non-trinitarians, indentured servants, American Indians, or atheists. He said atheists had no reason to act morally. **Locke** argued that atheists should not be tolerated because "promises, covenants, and oaths, which are the bonds of human society, can have no hold upon or sanctity for an atheist." He said also women and poor people should not be citizens.

The Anglican High Church clergy said that **Locke's** puny version of *toleration* was too tolerant.

At **Locke's** lead, Parliament (rich or noble) passed a very limited *Toleration Act*, with a *Bill of Rights* to order free elections, free speech (but only for MPs). It gave a few rights to non-Anglicans, (but none to Catholics, atheists, non-Trinitarians, women, people without property, Blacks, slaves, or Dissenters). Catholics in England and Ireland had practically no rights, religious, political, or civil.

Locke said, Jail beggars.

Harsh: Locke blamed the vice and idleness of the poor for the poverty of the day. He proposed that:

1. All able-bodied male beggars 14-49 be sentenced to hard labor and then made sailors for 3 years.
2. Maimed male beggars over 50 be jailed at hard labor for three years.
3. Child beggars, boys and girls, be "soundly whipped."
4. Poor children aged 3-14 be put in special schools to learn to work and then be put to work, and
5. Poor children be fed bread (& warm gruel in winter, the child's wages to pay for heating the gruel).

Make poor children work at 3. Make them pay for warm gruel in winter.

Locke's cruelty was considered wisdom by propertied Whites. Many poor children were sent to America as slaves. England had four Charity schools built and maintained by parishes for the poor by that time with a few hundred students. Half the students were put out as apprentices.

In agricultural cultures, the concept of childhood did not exist. Children worked as soon as they were able. By 1800, English elementary schools were mostly Charity schools.

1689 Social Contract

Political Theory: Like his *Letter on Toleration*, **Locke** published anonymously, *Two Treatises on Civil Government*; the second of which, *Of Civil Government*, discussed three great ideas, property, government, and revolution. He said there was a social contract between a governor and the governed. Authority derives solely from the consent of the governed. Governors must

Locke:

govern for the good of the people, who consent to be governed. "Where law ends, tyranny begins."

Government sole duty is to protect property. (like slaves) Inequality enforced by law

He said, "In a state of nature all men are free and equal; no person is by nature sovereign over other persons." "Before governments, everyone had the right to life, liberty, and property. Governments came into being through a social contract to protect and preserve such life, liberty, and property. In such pact, man does not forfeit any rights he had previously." In truth, before governments, people had whatever rights that they could by take and keep by force.

Locke said that government's sole duty was to protect property. Everyone has a "property" in one's own person, so what he makes by his own labor should be protected by government.

He said there is a right to property, but only within reason. A government is justified as a way to protect property. So property is legitimate, so is government. He said, "Don't tax profits, only imports and consumption." He influenced the aristocracy to be anti-monarchical.

Property is sacred. Man acquires property from his labor.

Locke said property was the product of one's labor. "Man. . . hath by nature a power. . . to preserve his property, . . . his life, liberty, and estate [land, slaves, wives] against the. . . attempts by other men. Man acquires as his property the products of his labor." He wrote, "As much as a man tills, plants, improves, cultivates, and can use the product of, so much is his property."

This was nonsense as the "nobles" he venerated never tilled or planted one blade of grass.

Locke's Nonsense	They inherited their land from their feudal ancestors, who were simply the best killers. (Land reformers in the 1900s separated property one earned and property that belongs to all people. Like roads and the village common.)
The duty to revolt.	Locke: <u>The people can and should revolt and change their government when the governor becomes a tyrant.</u> Government is to serve people, not impose ideas on them. Never before had revolution been based on a general notion of property rights. So, deposing kings and revolution was now based on rights to property. It was promoted by men who owned property, a tiny governing minority at the time. Historian Robert B Downs wrote, "The <i>Second Treatise</i> , although written to justify the 1688 "Glorious" Revolution (that ousted James 2), has proven to be the bulwark of all future democracies."
A baby's mind is a blank slate,	Biology, Locke's <u><i>Letter Concerning Toleration</i> was the first major presentation of the empirical theory of knowledge.</u> Locke stressed studying how we know things. Contrary to Descartes's theory of Man's mind, he believed <u>that the human mind at birth was a blank slate upon which would be written all Man's experiences, giving rise to knowledge which is perfected by reflection.</u> Locke thus differed from Plato, Descartes, Kant, and the scholastics, <u>who had said that the mind had certain innate abilities or principles.</u> He correctly said that our social environment shapes our beliefs, actions, and knowledge. Changes in the environment changes people. <u>So improve the environment, improve the person.</u> He revered abstraction, inferring universal realities from the common qualities of particular phenomena, as a unique human power
Education	Political Theory: Locke thus took a new interest in applying scientific insights to society. He advocated more widespread education (unless one were poor, black, indentured, etc.). There was a new confidence in social reform. Like Galileo, Descartes, and Boyle, Locke distinguished between primary and secondary qualities of objects. Primary qualities of solidity, extension, figure, mobility, and number are inherent in objects, but secondary qualities, such as perceived colors and odors, are in the observer.
Descartes influenced Locke	Descartes influenced Locke. Locke said, "The bare testimony of revelation is the highest certainty." but also, " <u>Revelation must be judged by reason.</u> " So reason in the end overcomes revelation. He did not limit reason to Aristotle's syllogisms. Locke said, "God [did not leave it] to Aristotle to make [man] rational." Reason is in two parts, what we know with certainty, and propositions it is wise to accept in practice, even if they are only probably correct. Locke showed how experience generates truth. Talk about the soul was replaced by talk of the mind.
1689 Essay on Human Understanding The biggest question.	Philosophy: Locke's <i>Essay Concerning Human Understanding</i> , is a critical assessment of human reason, and an absolute favorable assessment of experiment. It dealt with the origin, extent, and certainty of science. He said, "Reason must be our last judge and guide in everything." [Except in human relations] "New opinions are always suspected, and usually opposed, without any other reason but as they are not already common." His theory of ideas distinguished between simple passive ideas like color/size and complex ideas, like causes and effects and other abstract ideas
Who should govern? White rich males of course.	He wrote, " The great question which in all ages has disturbed mankind and brought on humans most of those mischiefs which have ruined cities, depopulated countries, and disordered the peace of the world, <u>has been, not whether there be power in the world, nor whence it came, but who should have it?</u> " Locke's answer was <u>propertied white males.</u> Locke's ideal society was, in short, <u>rule by the rich.</u>
God harmonized the physical and moral worlds	For Locke, <u>God harmonized the physical and moral worlds.</u> As moral knowledge (like all knowledge) was learned by experience, so the true and enduring causes of enduring human happiness, and thus of virtue, were identical to virtue. But, as we have seen, he was brutal to the poor. Oxford condemned it. Inspired by Newton's <i>Principia</i> , Locke thought natural laws could be applied to humans and their governance.
Locke's Essay on Human Understanding	Philosophy, Biology: Locke's <i>Essay Concerning Human Understanding</i> was important in the <i>Enlightenment</i> as "the bible of empiricism." He said, "Things are good or evil only in relation to pleasure or pain. Happiness, in its full extent, is the utmost pleasure we are capable of. The necessity of pursuing true happiness [is] the foundation of all liberty." and, as an empiricist, said, "No man's knowledge. . . can go beyond his experience." He profoundly disdained the lower classes. He said, " <u>A great part of mankind are . . . unavoidably given over to invincible ignorance.</u> ",

Locke eventually conceded that the five senses and the ability to reason were *innate*. He and **Newton** became friends, gave England intellectual leadership of the West from c.1687 to c.1730.

A C Grayling (1949-), Brit, a well known philosopher, asserts that *Principia* gave the world physical laws while the ascendancy of Parliament gave [some] citizens basic freedoms, redefining Western civilization, with the concept of the individual, the spread of literacy and the notion of scientific evidence as defining truth. Religious skepticism rose in parallel with the rise of scientific knowledge.

1690 **Huygens** *Treatise on Light* **Physics, Optics: Christiaan Huygens's** (ref.1656, '70, '72, '76) 1678 wave theory of light (*Treatise on Light*) was published and entered the body of knowledge. (It was not published in 1678 as it differed from the then accepted **Newton's** particle/ corpuscle theory. **Huygens** was first largely discounted. But his wave theory explained both reflection and refraction and in time became more accepted than **Newton's** in 1803. due mainly to **Thomas Young's** double slit experiment (see 1803 and 1838).

Biology: John Ray (1667-1705), Brit. naturalist. *The Wisdom of God Manifested in the Works of Creation* amassed a lot of observational data that animals were pre-adapted to survive. Said species are immutable.

1696 **Christianity: Thomas Aikenhead**, Scot, 20, theology student, ridiculed Christianity. The Presbyterians tried and hanged him for blasphemy (profane or sacrilegious talk about God or sacred things) .

Scottish Parliament ordered schools in every parish to teach children to read the *Bible*. Literacy exploded.

1697 **Skeptical** **Bayle** **Philosophy, Skepticism: Bayle** (ref.1680, '85, '87) published *Dictionnaire Historique et Critique* to "demolish the vices of religion." It was a huge meandering tome, essentially an encyclopedia, in four volumes published 1697-1702, the most popular book in the 18th century.

Problem of Evil. For every page of text, there were 20 pages of footnotes, which themselves had footnotes.

It ridiculed the Bible, doubted miracles' existed, said "heretical" beliefs should be tolerated as no belief was so certain that it justified suppressing another belief. He said that the only valid test of truth was reason. Bayle also asked if a creature that derives its being from God can ever be truly free.

A real God acts like a real God. This *Dictionnaire* had said that *the suffering and evil in the world negated the claimed benevolence or omnipotence of the God of the Bible or Koran* couldn't exist. *That is*, if either one existed, it would have acted powerfully and kindly and prevented evil or suffering. **Bayle** said that an omniscient God, if it existed, foresaw the massive suffering in the world to come, and he created humans anyway. He also argued that giving humans free will knowing they would cause suffering was like giving a criminal a knife knowing he will murder with it. **Bayle** said that there was no refutation of that argument. **Leibniz** started to devise refutations (see 1710). **Bayle** said true Christian must simply accept what God does.

Bayle: No answer to Problem of Evil / Suffering

Problem of Suffering has several valid sister arguments As noted, *The Problem of Evil/ Needless or Pointless Suffering* is one of several contradictions between God's various claimed attributes and the reality of the world, all of which problems logically negate the Abrahamic Gods. (See AD 414) As *The Problem of Evil/Suffering* is the most morally compelling problem with a God. It has attracted the most attention.

Dictionnaire **Bayle's "Dictionnaire"** way outsold **Locke** and **Voltaire**. It inspired *philosophes*. In the 1702 volume, he argued that society need not fear skepticism / Pyrronism because skeptics supported society's customs, just not society's religion. He said religion ought to be based on truth.

Voltaire called **Bayle** the "greatest master of the art of reasoning." Writers quoted

Bayle's arguments for atheism so often it was called the "arsenal of the *Enlightenment*."

1698 **First practical steam engine.** **First practical steam engine: Thomas Savery** (1650-1715) Brit. Water (in a mine) collects in a low spot in the mine. Water in a container above ground is heated until the container is all steam. There is a pipe from the hot container to the water in the mine. The container above ground cools and creates a partial vacuum which sucks up the water in the mine into the cooling container.

1699 **Friction** **Physics: Guillaume Amontons** (1663-1705) French, published his rediscovery of **da Vinci's** laws of friction, namely that friction on dry surfaces is solely proportional to the force applied, no matter the size of the touching surfaces. He was deaf and never attended a university. (More 1701)

Biology: Edward Tyson: (1650-1708) Chimpanzees are closer anatomically to man than to other primates.

Islam stagnated *Islam, although split into violently antagonistic factions (Sunnis and Shi'as), never experienced a Reformation, a Counter-Reformation, Renaissance, or Enlightenment* to rid it of its 7th century mind-set, which it still retains, to its intellectual detriment.

1700-49 Age of Reason Amontons Leibniz Voltaire Hume Montesquieu

18 th century	<u>Overview:</u> The giants of the 17th century had established a climate of opinion that there was <i>Order in Nature</i> . The wars of religion had left Europeans devastated and disgusted with religious extremism.
Humanism, Skepticism. Voltaire made Newton popular to the French.	Land was still the source of wealth. America was being explored going West. Siberia was explored by Russians going East into Siberia. Jews were freed from their ghettos. Scientists were discovering new facts; merchants were challenging monarchies and the Church. It was the <i>Age of Reason / Enlightenment</i> . <u>For England, America was a place to dispose of the poorest of its own society, vagrants convicts.</u>
Skepticism ruled life.	<u>In Virginia, under 10% of Whites owned over half the land.</u> - <u>Three intellectual concepts merged to produce the Enlightenment,</u> 1. <u>Cartesian rationalism</u> (doubt all knowledge not acquired first hand), 2. the rise of <u>humanism and skepticism</u> , and 3. <u>the philosophy of Locke and the science of Newton.</u> Robert Davis's book <i>Christian Slaves, Muslim Masters: White Slavery in the Mediterranean, the Barbary Coast, and Italy</i> , estimated that Muslims in the 16 th to 18th centuries captured and enslaved 1M-1.25M European Christians.
	Three enlightened rulers, Empress Catherine of Russia, Frederick the Great of Prussia, and Emperor Joseph of Austria, applied natural and reasonable policies to the legal, social, and economic affairs of their states. Four persons were most important in advancing the spirit of the <i>Enlightenment</i> , Voltaire , Diderot , Montesquieu , and Rousseau . Voltaire ridiculed the superstition and bigotry of organized religion.
1700 The Age of Science	<u>Due largely to Newton, the 18th century became the Age of Reason.</u> Newton's profoundly simple laws of motion and gravity gave people confidence in their ability to reason regarding social as well as scientific thought. <i>Deism</i> was a strong influence among the educated. Reason reflected the time's spirit, when everyone could be moral not just because they feared God. It could also be termed an <i>Age of Optimism</i> , marked by new confidence in one's mind, in science and reason. - <u>Despite Christian influence, virtually all educated people in the 18th century had faith in science.</u> In 1700, there were four scientific journals. In 1800 there were seventy five, plus medical journals. In this century, France led Europe in scientific intensity.
Can science cure social problems? Empiricism & rationalism both rejected divine causes	<u>Men (and women) of The Enlightenment sought to extend scientific methods and forms of knowledge to social and political life and to religion itself.</u> The two main schools for such endeavor were <i>empiricism</i> (knowledge comes from experience), and <i>rationalism</i> (knowledge comes from reasoning alone). Both of these <u>rejected supernatural causes</u> . Morals and social thought became more and more secular. Christians expecting fulfilment and justice in another life largely ignored seeking knowledge in this life, so lived in intellectual limbo. The last half of the century was an age of revolutions.
Thinking became secular	<u>Overview:</u> <u>Science changed the philosophical outlook but not society.</u> The rational spirit of the <i>Enlightenment</i> undermined all reasons for a Christian God and scriptural authority. It freed thinking humans from superstition. <u>Knowledge became scientific, not theologic.</u> The sciences continued to divide and specialize. Scientific theories proliferated, many to be discarded as better theories proved themselves. <i>Enlightenment</i> men had confidence that he or his successors could solve persons' problems.
Scientific societies	<u>Overview:</u> <u>Scientific societies were founded</u> in Birmingham, Manchester, Philadelphia, Boston, and several in France. The spirit of science pervaded. Due to Newton , the cosmos was shown to be explicable by simple universal laws. Frederick the Great of Prussia founded the <i>Berlin Academy</i> in 1700, largely for Leibniz . (ref. 1686, more Leibniz 1710)
Europe ruled	<u>Europe dominated:</u> From 1700-1850, Europeans conquered, colonized, and exploited the Americas, Australia, Africa, Siberia, Hindustan, and the Mid-East. All Europeans accepted the subjugation of darker skinned peoples, Hindustani, Africans, Amerindians, Malay natives. China and Japan stayed isolated and didn't change their ways. "BC" began to be used to designate years before Jesus .
1701	<u>Law, slavery:</u> British Lord Chief Justice John Holt ruled that a slave is set free when he sets foot in England. <u>This was ignored.</u> The slave trade continued until the Abolition Act of 1807. (In 1777, Scotland freed slaves brought to Scotland. See 1777). Parliament decreed all British monarchs must be Anglican.

1701 Education in America: After Harvard (1636), Ten Harvard minister alumni founded Yale to maintain and teach Puritan orthodoxy. Before the American revolution there were at least a dozen colleges in America.

1701 **Law of gasses** Physics, gasses: Boyle's 1666 law of gasses dealt with gas at a constant temperature. Guillaume Amontons: (1699), while developing an air thermometer, saw that the pressure of air rose about 1/3 when air was heated from the freezing to the boiling temperature of water. He did not further quantify /measure the expansion. Like Boyle, he speculated that there was an absolute cold temperature.

Amontons's observation of the power of heat (not yet called thermal energy) was a precursor to the field of thermodynamics (the science of the interconversion of energy, particularly heat, into work).

Energy is the capacity of a physical system to do mechanical work. It has several forms:

Energy is the capacity to do work. Work is the expenditure of energy. Power is the rate of doing work or expending energy. The SI unit of power is the watt. International. The standard measure of power.)

<u>Kinetic, "KE"</u>	The energy of a body in motion, linear or rotating).
<u>Potential E</u>	Energy based on a position, a raised hammer, water behind a dam, a wound up spring, an archer's drawn up bow, a spinning flywheel. <u>When it moves it becomes kinetic energy</u>
<u>Chemical E</u>	Anything flammable burns (a chemical reaction) producing heat to make steam to turn wheels.
<u>Thermal E</u>	a/k/a heat, the temperature difference between two systems at issue.
<u>Nuclear E</u>	Produces thermal E by changing the the atoms in its fuel. The Sun produces its light and heat by nuclear action.
<u>Sonic E</u>	The energy of sound waves like a sonic boom or one's voice. .
<u>Ionization E</u>	The form of energy that binds electrons to the nucleus of its atom.
<u>Radiant E</u>	Can transit "empty" space. It includes electromagnetic waves (light, radio waves,) Light and thermal waves make objects so hot they glow, like filaments in a light bulb.
<u>Gravitational E</u>	The attraction between two objects based on their mass and separation
<u>Electromagnetic</u>	Energy from electromagnetic waves (radio, light, gamma rays, x-rays).

Some of these forms can transform into another. In a closed system, the total amount of *energy* is constant. (*Law of Conservation of Energy*). It is also the *First law of Thermodynamics*. (*SI = Systeme Internationale*)

Calculate kinetic energy? (V is velocity)

Newton: "Object has mass of 5 and velocity 10) has the kinetic energy of mass times V, mV, 50 units.

Leibniz: Object has mass of 5 and velocity 10) has the kinetic energy of mass times V squared, mV^2 , 500 units.

Both **Newton & Leibniz were wrong**. Kinetic energy was later found to be half of mV^2 , 250 units.

Energy and work are measured in the same units, foot-pounds, ergs, joules

(See 1735-**Chatelet**, 1820, 1905-**Einstein**).

c.1703-25 **Peter the Great forcibly modernized Russia** Russia Czar: Peter the Great (1672-1725), forcibly modernized Russia, built St. Petersburg, his grand new capital. An estimated 30,000-100,000 conscripted workers died from cold and fever. He put the nobles in the barracks or behind government desks, reformed the National Guard by killing hundreds, simplified the alphabet, abolished female seclusion at court, introduced the Gregorian calendar, drafted serfs for the army and arms factories, built and modernized the military, established a navy.

He outlawed beards and caftans, introduced the idea of science to Russia, where learning had been theological, built up Russia's mining industry, killed landlords who concealed mineral resources on their land, built canals to link the Baltic Sea to the Caspian Sea, exported minerals and lumber. He killed his son, Alexis, whom he suspected of plotting a coup. He died at 52 of a urinary disease. Most serfs, and some nobles remained illiterate.

Russia was the last European country to formally abolish serfdom.

1703-04 **Newton** Physics, Optics: Newton, then Master of the Mint, became president of the Royal Society. After Hooke died, he published Opticks in English, written mostly in 1675, but not published to spite Hooke. Opticks said the speed of light is finite, and light takes 8.16 to 8.3 minutes, depending on the season to get from the Sun to Earth.

He was knighted in 1705. He used his presidency of the *Royal Society* to disparage **Leibniz** and the Astronomer Royal **John Flamsteed**. (In 1726, when **Newton** died, he was given a royal funeral in Westminster Abbey). **Voltaire** said, "We are all his disciples now."

1704 **Jonathan Swift** (1667-1745), dean of St. **Patrick's** Anglican Cathedral in Dublin, wrote *The Tale of a Tub*, an allegorical satire. It ridiculed the bigotry of warring religions, the pedantry of dishonest clerics.

1705 Astronomy: Edmund Halley (ref. 1678, '84, '87) said that the comets of 1531 and 1607 were the same comet as 1682's, with a 76 year orbit. Said comets have regular orbits; so it would return in 1758. (It did)

Chemistry: **Abraham Darby** (1678-1717), Brit., developed a method of producing cheaper iron. He used coke in a blast furnace. It worked better than coal as it had no impurities to impart to the iron.

1706 Religion, Slavery: **Cotton Mather**, a major intellectual public figure in New England, slave owner and Congregationalist preacher, citing the *Bible*, said a law freeing baptized slaves was not Christian.

1707 Physics: **James Whistler** published **Newton's** lectures on algebra & equations as *Universal Arithmetic*.

1709 Political Economy: **Bernard Mandeville** (1670-1733), Anglo-Dutch philosopher and satirist, lived most of his life in England. Said society is rightly based on the rich exploiting the poor. Vices provide prosperity more than virtue. His main thesis was that the actions of people cannot be divided into lower and higher.

Private vice is a public benefit Said, "The higher life of persons is a mere fiction introduced by philosophers and rulers. He said that vice, at variance with the 'Christian virtues' of his time, was a necessary condition for prosperity. The so-called higher virtues are mere hypocrisy, and arise from the selfish desire to be superior to the brutes. He said the great paradox was that "private vices are public benefits." It spreads the wealth.

Libertines are good for the economy **Mandeville** argued that the basest behaviors produce positive economic effects. A libertine's spending will employ many people, directly and indirectly. So the actions of libertines benefit society in general. He called for politicians to take advantage of such behavior. He argued for public, state-controlled brothels. Said, "Private vices by the dextrous management of a skillful politician may be turned into public benefits." This philosophy gave great offence at the time, and was called as "false, cynical and degrading." Economically it makes simple good sense..

Division of labor Economics: **Mandeville** also early described the benefits of the division of labor. Decades later, in 1776, **Adam Smith** in *Wealth of Nations* used some of his examples. Both **Smith** and **Mandeville** said that individuals' "selfish" actions collectively bring about a public benefit.

Smith said virtuous self-interest resulted in invisible co-operation, whereas **Mandeville** believed it was non-virtuous self-interest which led to invisible co-operation if properly channeled.

1710 Religion: **George Berkeley** (1685-1753) Anglican bishop, a leader in the movement to show that theology had a rational defense to counter arguments for skepticism and atheism, said that all that can be known with certainty to exist is the mind and its ideas, including those ideas that seem to represent material substances. *Esse est percipi* /To be is to be perceived. "I have no reason to believe the existence of matter. Everyone sees those same substances as material objects are just ideas in God's mind." **Samuel Johnson** kicked a stone and said, "I refute it thus." Evil/suffering were inconveniences and due to nature, under God, conforming to the "most simple general rules."

c.1710 Mathematics, Energy: **Leibniz** (ref. 1686-7) invented the binary system, wherein all numbers are written using just 0 and 1. To **Leibniz**, 0 stood for nothingness and 1 for God. He also proposed two axioms to **Aristotle's** laws of thought, the *principle of sufficient reason* and the *identity of indiscernibles*. **Leibniz** used the term *vis viva*, living force, to refer to the concept of "energy."

Problem of Suffering **Leibniz** answered **Bayle's** challenge to refute the *Problem* of Evil/Suffering with the only full length book he published in his lifetime, *Essais de theodicee sur la bonte de Dieu, la liberte de l'homme et l'origine du mal / Essays of Theodicy on the Benevolence of God, the Freedom of Man, and the Origin of Evil*. **Leibniz** believed in a linkage between human and divine reason and the laws of nature. He and **Bayle** had quarreled for years about the Problem of Evil. **Bayle** had asserted that there was no way to refute The Problem.

Theodicies give actual reasons **Leibniz** coined the word *theodicy* (Greek *theos* = God, *dice*= justice, i.e., divine justice) to mean actual reasons how his God could ethically co-exist with suffering/evil. He proposed several theodicies. His *theodicies* purported to use reason while traditional *theologies* purported to use revelations from a God.

1710 Philosophy: **Leibniz** analyzed "evil." He distinguished three types of evil: metaphysical evil (the evil in any finite and imperfect thing, like humans), physical evil, and moral evil (sin resulting when humans cause suffering to others). He said that good and evil (suffering) are inseparable as each is meaningless without the other. That is, if everybody did the right moral thing at every opportunity, there would be no word for good or evil. Similarly, *altruism* is praiseworthy only if *selfishness* is an option.

But, sometimes there is no clear distinction between a good act and an evil act. He also adopted

Augustine and Aquinas's argument that evil does not exist as it is simply the absence of good.

Problem of Suffering: A holiness problem or existence problem.

At the time, **Leibniz**, like Medieval theologians “knew”/assumed that a perfect God existed. So he devised “theodicies” to show that his God could reasonably allow evil /suffering in a world he created. Like others, he used a God to prove a God. Some of **Leibniz's** theodicies attacked the mental ability of humans (whom God created in His image) to understand.

Aquinas had devised five “natural theology” proofs that say that there are observable facts in nature which infer that a God exists. That is, they don't use a God to prove a God.

- 1710 Some **Leibniz** arguments which assume God exists are variations of the humans-have-limited-ability-argument, that means humans-aren't-smart-enough to understand why God allows evil and suffering.

God made humans dumb on purpose? Another **Leibniz** argument is that there aren't any real evils, only apparent evils; that evils we see are really goods to the universe; they are only evil to people's narrow human perspective.” But, saying God is benevolent in the first place implies that people are smart enough to distinguish good from evil. Saying people can't tell evil from good contradicts this. (**Hume** in 1751 responded to this theodicy). Humans are probably smart enough to distinguish good from suffering.

Hidden Reasons theodicy

Another very similar man's-limited-ability-argument, is the Hidden Reasons theodicy: Namely, There are reasons beyond man's comprehension why God permits evil and suffering. God is infinitely wiser than humans, so we could not be sure that there was not some greater good or some good reason that justified God allowing evil and suffering. Contra, as God presumably created humans, God knowingly made them too dumb to know God's reasons to allow evil. It does not seem logical that a God would not want humans to know why they suffer.

One **Leibniz** theodicy is that an assumed God OKs suffering as it is retribution for man's evil actions.

Another **Leibniz** theodicy: Moral evils (caused by humans) add to the overall perfection of the world, and hence are not *genuinely* evil. That is, evil and suffering make the world more perfect. If this is true, does it mean that more evil acts would make the world more perfect?

- 1710 Another **Leibniz** theodicy: “God's fore-knowledge of Man's evil acts did not involve predestination. Only minds exist and everything has a mind. Minds come in degrees, starting with matter (whose minds are simple) to God (whose mind is infinite). Humans are between these extremes. It is clear that ideas rule people's minds. The universe is the set of all finite minds that God has created.”

Leibniz theodicies

Another **Leibniz** theodicy: God's will regarding good in the universe is decretal (that is, like a judicial opinion or decree), but God's will regarding evils is merely permissive; and permissive willing of evils is morally okay as long as the act of permitting the evil is a necessary condition for meeting God's outweighing obligation, namely to create the best world.

This is the best possible world

Another: God, being omniscient, loving, and omnipotent, had to and therefore did create the best of all possible worlds, even though it contained some evils and suffering. (**Leibniz** traced this idea to **Plato**.) (**Hume** in 1779 named four things that a perfect God, if one existed, could easily have done to make the world a far better place. See 1779)

Can free will outweigh suffering? No, they are in different kinds of concepts. So can't be validly compared.

Leibniz proposed an ontological theodicy (proof from reasoning alone). (In 1751, **Kant** said it *assumed*, not *proved*, a God.) *Assuming* the matter to be proved is a logical fallacy. All **Leibniz** theodicies noted so far *assume* a God, the matter to be proved. In other words, the conclusion is embedded in a premise.

Leibniz also posited “natural theology” theodicies, one was a *cosmological* argument (there has to have been a first cause of all matter, and as we can't think of a rational reason for the first cause, something beyond reason must be the first cause. It must be God, which for **Leibniz**, was the Christian God.)

Free wil is a personal ability, but suffering is an involuntary condition imposed by

Leibniz also posited the *argument from eternal truths* (certain statements are always true and eternal, and can only exist in the mind of a God), and the *Argument from Pre-established Harmony* (akin to the *Design Argument*) i.e., the entire universe is one harmonious system expressing God's plan.

Some of **Leibniz's** theodicies said that God could justifiably permit evils and sufferings if his *assumed* God had a morally sufficient reason, namely a greater good, that God could not actuate without it inevitably causing some evil or suffering.

an outside force.

The most common greater *good* that theologians cite is *free will*. Namely that God gave humans *free will*, even to sin, and *free will* is such a great good that it outweighs *any suffering* that humans exercising his *free will* may cause.

1710 This assumes that *free will* and *suffering* are somehow logically comparable so that one could in fact validly “outweigh” the other.

But they cannot logically be compared. They are in different categories of concepts and as such are judged by different criteria. They are apples and oranges. A “category error” is when one applies a quality of one matter to another matter to which that quality does not apply.

The *Free will* in a *free will defense* is a personal ability. “*Suffering*” is something imposed from outside on a person or creature. So a comparison is meaningless.

Another error in this argument is that it makes no reasonable distinction between minor inconsequential, thus irrelevant, restrictions on *free will* and total absence of *free will*.

Hume in 1751 expressed three refutations of the *free will* defense. In short: 1 The *defense* does not affect suffering caused by natural events. 2. It ignores the *free will* of victims. 3. It misstates history as God in the *Bible* intervenes in human conduct (**Hume’s** fuller exposition is at 1751)

Such argument fails as it, *inter alia*, 1. *assumes* the existence of its God. 2. It negates its God’s claimed omnipotence as it says that its God could only give humans *either* total *unrestricted free will* or *zero free will*. That is, that God couldn’t say to Adam, I give you *free will except* to cause suffering to innocents. But remember, God did say to Adam, eat any fruit *except* from the tree of knowledge Attempts to refute the *Problem of Evil/Suffering* whether a theodicy or “defense” will be discussed as they arise.

Free will is central in religion, philosophy, ethics, and law. *Free will* has different meanings for different Christians and philosophers. (See pp.196-198 for the range of views on *free will*.)

Most people have little actual free will.

There are other problems with the *free will* defense. One problem is that most people are under the control of a master or a lord, or a king and have no actual free will.

Billions of people simply live in abject poverty, in hunger, illiterate, subject to debilitating and painful diseases, ignorant of anything other than that they have to do some backbreaking work all their waking hours every day of their lives. They have no concept even of the concept of *free will*. It is insulting to tell such persons that they have *free will*.

Free Will defense: God doesn’t protect victims.

God’s inaction when someone is causing suffering to another is that it negates God’s claimed omnipotence and benevolence. Could or would a benevolent omnipotent God have told Adam and Eve, you shall have *free will* except to cause suffering? God limited Adam and Eve’s free will regarding the tree of knowledge. Could not God know whose *free will* was more worthy of preserving?

God has OK’ed all suffering from day one.

Apart from the logical impossibility of saying *free will* “outweighs” suffering, consider sufferings caused by natural causes. If the traditional perfect God exists, he has knowingly OK’ed every horrible suffering from natural disasters and evildoers from the beginning. *Black Death* / bubonic plague (75-200 million dead), The 1918-19 Spanish flu (50-100 million dead), infant deaths (billions and billions), earthquakes, most animal deaths (acts of God?). The list is endless.

Aldous Huxley (1932) said, “Christian philosophers have easily justified imperialism, war, torture, and ecclesiastical tyrannies of every sort, from the tyranny of Rome to . . . New England.”

Leibniz on the Design Argument. Happiness isn’t goodness

Leibniz in 1710 had said that God created the best of all possible worlds. “Human happiness is an inadequate measure of goodness in the world. [Why not?] Humans are not competent to judge goodness.”

Jesuits argued that God was not obliged to create the best world, just a morally acceptable one. This Jesuit opinion, like most opinions on the claimed God’s motives, is pure speculation. There are many indications in the *Bible* that *infer* various and varied and contradictory motives of God.

1710 One Leibniz theodicy: It could be argued that it could be proved that if God was an infinitely perfect being, and so must have created a world with the best balance of good and evil. Another: “As the truths of philosophy and theology cannot contradict each other, some evil or suffering, is unavoidable in any creature less perfect than its creator.” So such creator must exist.

A defense is a possibly

At some point, the concept of a “*defense*” to the *Problem of Suffering* developed In contrast to a theodicy. A defense only purports to show that evil and suffering are possibly compatible

true, not even
probably or
necessarily
true
situation.

with a perfect God under certain conditions. A defense is a story that may or may not be true. Whether a God exists has to be the first and most important theological issue conceivable. It is hard to accept a *possibly-true* argument as credible to prove something as important as a God's existence. (In the 20th Century, Protestant theologian, **Alvin Plantinga** did claim he found a *defense*, not a *theodicy*, and declared victory (see 1974, '77). Is the best a theologian can do for his God is a *possibly-compatible-under-specific-conditions-argument* for God, but not a *theodicy* (actual positive arguments for God), that's pretty weak. Such theologian is describing his God like a criminal defendant in a trial desperately searching for some *possible* argument that some jury person might think raises a reasonable doubt. *Possible* arguments aren't sufficient. A omniscient God could presumably inspire better.

As noted at AD 414, *The Problem of Suffering* is one of a number of logical problems for an Abrahamic God based on contradictions among its claimed attributes or a contradiction with the real world.

Such contradictions logically negate an **Abrahamic** God. If any argument, including those *Omnipotence paradoxes* discussed at AD 414, logically negates God's existence, such God is negated. We discuss the *Problem of Suffering/Evil* as it is compelling and attracted the most theological responses.

1710 **Hell, Voltaire** Hell: Historically Catholics have been told that they will go to Hell for eternity if they commit a mortal sin and it is not forgiven. **Voltaire** said of Hell, "We are bound to believe, under pain of being damned, that the God of all mercy, to teach sinners how to live after their death. . . damns to all eternity the greater portion of mankind for venal faults, and that by special miracle of his divine love he causes them to endure everlastingly that he may everlastingly torture them."

1711 Philosophy: **Alexander Pope** (1688-1744), "A little learning is a dangerous thing. Drink deep, or taste not the Pierian spring." In 1731, "Know then thyself, presume not God to scan. The proper study of mankind is Man." In 1734, "Slave to no sect, who takes no private road. But looks thro' Nature, up to Nature's God."

1712 Technology: **Thomas Newcomen** (1668-1729), Brit. ironmonger, devised a practical piston steam engine to pump water out of coal and tin mines. It was marginally efficient, but economically viable as it burned waste coal and worked. (See 1698-**Savery** and 1765-Physics, **Watt** for more.)

1714 Catholic fear of science: **Leibniz**, a known firm believer, said species may not be immutable. Jesuits therefore stopped him from opening an *Academy of Science* in Vienna.

Leibniz, two kinds of truths

Epistemology: **Leibniz** wrote *The Monadology*, "There are two kinds of truths, truths of reasoning and those of fact. The truths of reason are necessary and their opposite is impossible. The truths of fact are contingent and their opposites are possible."

Why does matter exist

In 1686 and again in 1714 **Leibniz** asked, "Why is there something rather than nothing? **Martin Heidegger** said it's "the fundamental question of metaphysics."

Leibniz, Cartesian Clocks

Leibniz also created the great analogy of the Cartesian clocks, which postulated that mind and body don't interact, but only seem to, as they are synchronized by God. (Wordplay) (Analogies compare a new concept to a familiar concept to explain the new concept. Examples: They're like peas in a pod. Analogies are valid only if they are similar to the matters they analogize.) **Leibniz** also said, "It's easier to be original and foolish than original and wise." He said gravity was a miracle from God

Energy Leibniz vs. Newton

Physics, **Leibniz vs. Newton**: **Newton** said when two identical objects collide head on, their energy disappears. **Leibniz** said, when two identical objects collide head on, their energy remains; and goes somewhere, like heating the objects (or is absorbed into entropy), **Leibniz** was right.

Navigation:

Such event follows the *Law of Conservation of Energy*. (Two centuries later **Einstein** discovered the *Law of Conservation of Mass-Energy*.) **Newton** reached near God-like stature in England. After disasters in the British fleet, the *Board of Longitude* offered £20,000 for a way for a ship to know its *longitude*. (**Philip 3** of Spain had in 1615 offered a prize for the same reason.

1715 The Enlightenment: **Herman Boerhaave** (1668-1738), a famous professor of medicine (at Leiden) lectured on **Newton**, said science must always use experiment and observation, aided by math and reason.

1715 Physics: **Daniel Fahrenheit** (1686-1736) made an accurate thermometer based on mercury's heat expansion.

1718 Chemistry: Building on **Boyle's** concept that atoms could "cluster" (i.e., combine with atoms of another

- Molecules** element, ref. 1661), the French chemist **Étienne François Geoffroy** told the French *Academy* his theories of chemical affinity to explain combinations of particles. He said that a certain alchemical “force” draws certain chemical components together. This was a small step toward the modern concept of a “valency bond” combining atoms of elements to form a new substance. (See 1789)
- 1719 **The right to revolt** Political Theory, **People may revolt: Daniel Defoe** (c.1660-1731) Brit, writer of many novels (including *Robinson Crusoe* (1719), political tracts, journalist, social critic, and spy, wrote, “We do hereby declare that if the House of Commons . . . betrays the trust of the people: it is the undoubted right of the People . . . to call them to account for the same; and by Convention, Assembly or by Force, may proceed against them as traitors and betrayers of their country.” He was jailed frequently.
- 1721 **Montesquieu** Political Theory: Charles-Louis de Secondat, Baron de la Brede et de Montesquieu (1689-1755), lawyer, philosopher, became famous when he published, anonymously, *Persian Letters*, which ridiculed the French kings. (more **Montesquieu** at 1748, *The Spirit of the Laws*).
- 1721 Medicine, smallpox: In 1709, a slave of **Cotton Mather** told him that Africans innoculated against smallpox using smallpox. **Mather** told Boston doctors. Most vehemently rejected it. During a smallpox epidemic in Boston, Lady **Mary Montagu**, who had lived in Turkey wrote a letter describing how the Turks innoculated against smallpox using smallpox. It was made public. See 1796
- 1726 **Source of “Greatest happiness for the Greatest number.”** Philosophy: Francis Hutcheson (1694-1746), Ulster Scot, a founder of the Scottish *Enlightenment*, Chairman of Moral Philosophy at Glasgow. In *Inquiry Concerning Moral Good and Evil*, he wrote, “When faced with having to choose between alternatives we have to “compute” action will lead to the highest virtue which “is in proportion to the Number of Persons whom the happiness shall extend.” (**Joseph Priestley** paraphrased this in 1768.) **Hutcheson** said, “Wisdom denotes the pursuing of the best ends by the best means.”
- Hutcheson** and **Henry Home/Law Lord Kames** (1734 and 1777) revolutionized Scottish intellect, created a new understanding of human nature and society. **Hutcheson** sought to refute **Hobbes’s** materialistic selfish view of Man, said morality was from God. He taught in English, not Latin. He said humans are born with an innate moral sense. Everyone’s ultimate goal is happiness, to make others happy. So self-interest and altruism merged in his System of Moral Philosophy.
- Scottish Enlightenment** Philosophy: The Enlightenment in Scotland was as influential as the Enlightenment in France. It presented humans as the product of history. Its great discovery was that people are creatures of his environment. It transformed every branch of learning. It created the *Encyclopedia Britannica*. It broke from rigid Presbyterianism and sought to liberalize and humanize it, not reject it as the small world of French *philosophes* rejected Christianity.
- 1725 Religion: Glasgow University and Edinburgh University liberalized and softened the harsh tenor of Scottish Presbyterianism and many educated leaders of the Scottish Enlightenment. **John Simson**, professor of Sacred Theology at Glasgow directly challenged the harshest of old Calvinist dogmas and taught a kinder and gentler God. Enlightenment ideas spread to the American educated. Islam had no *Enlightenment* and remains the prisoner of the 7th century.
- Principi di una Scienza Nuova. Three stages of history.** History: Giambattista Vico (1688-1744) Italian political philosopher, historian, and jurist, said man’s social development had three stages, primitive *Age of the Gods*, superstitions, myths, divinations. Priests ruled. Gradually this became the *Age of Heroes*, strong men, patriarchs ruled, communities became larger units of government, religions remained mythological. Then *Age of Man*, the masses gained full rights, laws became rational. This thesis has become well known among historians.
- 1726 **Swift, Satire** Social Criticism: Swift (ref. 1704), supported the Irish struggle for freedom from England. He wrote *Gulliver’s Travels*, where humans were not rational, only beasts capable of reason. His 1729 satire, *A Modest Proposal*, described the atrocious condition of the Irish poor and proposed that the Irish sell their children to their British landlords to eat. One benefit, it would reduce the number of Catholics.
- Swift Quotes** “When a true genius appears in this world you may know him by the sign that the dunces are all in agreement against him.” “Whoever could make two ears of corn, or two blades of grass grow where only one grew before, would do more of essential service to his country than the whole race of politicians.” (See 1960’s-**Borlaug**). There is nothing so extravagant and irrational for which

some philosophers have maintained for truth," "In reason, all government without the consent of the governed is the very definition of slavery." "We have just enough religion to make us hate, but not enough to make us love one another." (**Voltaire** also used this thought. See 1763)

1726-29
Voltaire,
supreme
debunker of
hypocrisy.

Philosophy: Voltaire (1694-1778), (ref. p. 1, 814, '89, '91, '96, 1532, '72, 1624, '97, 1710, pen name of **Francois Marie Arouet**, French, historian, philosopher, playwright, genius.

- **Gibbon** said he was the most extraordinary man of the 18th century, supreme debunker of hypocrisy, major figure of the Enlightenment. He was Jesuit-educated, and defended victims of religious intolerance. (**Galileo, Descartes, Bayle, Voltaire, Mersenne, Bellarmine, Diderot, de Chardin, Frederick Spee, Lemaître**, and **Grimaldi**, all had Jesuit educations.)

He led the
Enlighten-
ment

He wrote voluminously on all subjects, 20,000 letters and 2000 books/pamphlets in his lifetime, collected into 200 volumes, often anonymously. He advocated social reform; he was imprisoned, exiled, and/or hounded into seclusion several times for his writings. In 1726-29, he was in exile in England as a rich Frenchman had corruptly had him sentenced to jail. He developed an admiration for England compared to France's absolute monarchy. His first play, *Oedipe*, at 24, was a great success. (More **Voltaire**, 1735-6, '50(1751), '53, '55, '59, '62-4, '66, '78, '89, '91, '96, 1848, 1916, 2021, pp. 395, 397, 408, 417-19, 465, 482).

1729 **Physics: James Bradley**, Brit, Light travels 301,000 Kps. (only .4% high). Earth's motion distorts starlight.

Jean Meslier,
found to be
an atheist
philosopher
after he died

Philosophy, First Modern Atheist?: Jean Meslier (1664-1729), Catholic priest, wrote *Memoir of the Thoughts and Feelings of Jean Meslier, Clear and Evident Demonstrations of the Vanity and Falsity of All the Religions of the World*, 600 pages. It was discovered on his death. It anticipated nearly all the major arguments against God and for atheism. As a priest, he did not publish it during his lifetime. He did not want to break his vows of priesthood. **Voltaire** bought a copy and quoted it extensively.

1730
Nature
is moral

Religion, deism: Matthew Tindal, (1657-1733), England's most influential deist, in *Christianity as Old as the Creation* (known as the deists' *Bible*), savaged Christianity, said God made the universal laws of nature, including pursuing pleasure and avoiding pain, as the sole moral nexus between Man and God. "It invariably follows, nothing can be part of divine law but what tends to promote the common interest and happiness of [Man]." The true God is **Newton's** God, who created the universe and its laws.

The logical implication of **Tindal's** ideas was that Christianity added nothing that nature didn't teach. He said all religious dogmas were "unverified nonsense." The House of Commons had the book burned. The French philosophes came to believe that the Catholic Church was the deepest foe to their attempts to reform society. Most *philosophes* were atheists or deists who believed God, if one existed, spoke to people through nature, not through priests.

1734
Supreme
constant
critic of
nonsense

In England, **Voltaire** saw Lockean *Enlightenment* ideas and Newtonian physics. **Voltaire** made **Newton** well known in France through his 1734 *Lettres sur les angliques*, and *Lettres philosophiques* including the idea that reason required sensory experience to know the world other than its own ideas. He corresponded with **Frederick 2 the Great** of Prussia, **Catherine the Great**, and **Louis 15**.

His ideas promoted the French Revolution. His overriding concern was freedom of thought. He set much of the Western world's agenda for the 19th century. French kings hated him.

1734 **Physics, Cosmology:** Cloudy blobs of light, as opposed to distinct stars, had been noted in the heavens by, *inter alia*, **Ptolemy** (AD 150), **al Sufi** (964), **Huygens** (1659), and **Halley** (1715).

Emanuel Swedenborg (1688-1772) Swede, Lutheran, philosopher, theorized that all matter is ultimately composed of dimensionless points of total and pure motion. He suggested a *nebular* hypothesis of stars and planets, later developed by **Kant** and **Laplace**.

1734 **Philosophy: Henry Home** (1696-1782) Scot, said laws were made to protect property [very few people owned property]. The law is a living thing, being founded on experience and common sense. Reason and the laws of human nature (varying as conditions change) were the basic principles of law. Said, "A sense of property is the start for all social arrangements." (See 1777)

Home
became a
Law Lord

Said, "Man is disposed by nature to appropriate." He organized history into four stages, 1. hunting/fishing, 2. herding 3. agriculture (when communal cooperation required laws and a governing structure), and 4. towns, which needs more laws to regulate all the new interactions among people.

Said, "Without private property there would be no industry, and without industry, people would remain savages forever." In 1752, he was made a judge, thus became Law Lord **Kames**. He incorrectly believed that races came from separate stocks, a common belief. (More **Kames** 1777)

- 1735 Liberty of the press: **John Peter Zenger**, a New York publisher, published an article critical of the New York colonial governor. At the time, colonial law / English common law, held that truth was not a defense to an accusation of seditious libel; indeed, truthful information could be even more dangerous than lies, because it was more believable. **Zenger** was held in jail for a year and then tried.

Chief Justice **Delaney** disbarred two prominent attorneys planning to defend **Zenger**. **Delaney** told the jury that the law was clear, that **Zenger** published libel. The jurors took ten minutes to acquit **Zenger**. Contrary to popular belief, the case did not immediately establish the principle that truth cannot be libel. Only in 1805, in the newly independent USA, New York state passed a law that said truth was a defense against a charge of libel. It's now firmly embedded in U.S. law.

- 1735 Meteorology: **George Hadley** (1685-1768), Brit, said that warm air rising over the equator moved to the poles in the upper air before cooling and sinking, making a circulation pattern, now called the **Hadley** cell.

- 1735 Biology: **Carl Linnaeus** (1707-78), Swede, divided all living things into seven levels. He had once believed that all species were fixed at creation (*Genesis* 1:21). But when he saw farm animals cross breeding, he changed his mind and devised a logical method of classifying animals and plants, that is, how they reproduce; namely sexually.

Linnaeus:
Man is a primate.
He said, "What is the difference between people and apes, based on natural history?
Most definitely I see no difference. I wish someone could show me one difference."
His seven levels were Kingdom-animals, plants, fungi, bacteria. Phylum- Chordata, animals with head to tail nerve chords, fish, birds, man. Group-Vertebrates. Class-Mammals. Order-Primates. Genus-*Homo*. Species-*sapiens* (wise man).

Taxonomy: **Linnaeus** refined and improved his classifications several times. Once, he was shown reddish water which the Lutheran church in Sweden said was blood from the wrath of God. **Linnaeus** said it was microscopic insects. Bishop **Swedberg** denounced this explanation as a Satanic abyss saying the water was a miracle from God. **Linnaeus** modified his explanation, said it was a miracle how God did it..

Catholic fear of dissent: As he classified humans as primates, and that plants reproduced sexually, his works were banned in Catholic lands. He said that there were five *varieties* of humans: Wild man, American, European, Asiatic, varying by education and situation.

Biology: Some insects haven't changed in 50M years. Humans evolved from *Hominids* in 7M years.

- 1735 Physics: **Newton's** in 1683 had said that the Earth bulged at the equator due to centrifugal force from a spinning globe. This was confirmed. The Equator is c.80 miles longer than the Earth measured top to bottom around the poles. So sea level at the equator is c.13 miles further from the center of the Earth than at the poles. So also, Mt. Chimborazo, Equador, near the equator, is further from the center of the Earth than Mt. Everest.

- 1735 Energy: **Gabrielle-Emilie Le Tonnelier de Breteuil du Chatelet** (1706-49), brilliant French noblewoman, and accomplished mathematician, a **Voltaire** mistress for over a dozen years, They lived and traveled together. She founded a lab where she and visiting scientists studied energy, applying **Newton's** laws. She liked **Leibniz's** claim that the kinetic energy of an object (capacity to do work due to a body's motion) was its mass times its velocity squared ($KE = mv^2$), not **Newton's** idea that KE was just mass times velocity ($KE = mv$). **Chatelet** said $KE = mv^2$, **Leibniz's** theory. English physicists stuck with **Newton**. Germans favored **Leibniz**.
(Both were wrong. In 1820, it was corrected to $KE = \frac{1}{2} mv^2$.)

- 1736 Math: **Leonhard Euler** (1707-83), Swiss. One of the most prolific mathematicians, physicist, astronomer, geographer, logician, and engineer made important finds in all fields of math, including solving the formidable 3-body problem (the relative movements of the Earth, Moon, and Sun). He created *differential calculus* practically single-handedly and graph theory, *Mechanics* while also making pioneering contributions to several branches such as topology and

analytic number theory. His *Mechanics* recast **Newton's Principia** into explicit analysis, using the full power of calculus. He did much to fuse Newtonian and Leibnizian math.

- 1736 **Skeptical**
Frederick Quotes **Philosophy, skeptic: Frederick 2 the Great** of Prussia (1712-86), "Religion is the idol of the mob; it adores everything it does not understand." "Theologians are all alike, of whatever religion or country they may be; their aim always to wield despotic authority over men's consciences; they therefore persecute all of us who have the temerity to unveil the truth." Nonetheless, he said, "All religions must be tolerated, everyone must be saved in his own way."
- 1738 **Voltaire** and **Chatelet** (ref. 1734-35) wrote *Elements de la philosophie de Neuton / Elements of Newtonian Philosophy*, which made **Newton** accepted and influential for French scientists. (In two years, there were 17 books in French about **Newton's** ideas.)
- 1738 **Hydro-dynamica**
laid the basis for the kinetic theory of gasses **Physics: Daniel Bernoulli** (1700-82), Swiss, saw a link between temperature and density of gasses. He published *Hydrodynamica*. It laid the basis for the kinetic theory of gasses, namely, gasses consist of innumerable atoms or molecules in constant random motion, bouncing off one another, and their impact on the surface of a container causes pressure within the container. (**Newton** had thought that gas molecules were static held in place by repulsive forces between them.) So the container expands and/or becomes warmer. What we feel as heat is just the kinetic energy of molecules' motion. This was not accepted until 1821, as the law of *conservation of energy* had not been established, nor could physicists see how collisions of molecules could be perfectly elastic.
- How wings lift planes** He also discovered that when a stream of fluid (gas or liquid) speeds up, its pressure drops. Now **Bernoulli's Law**. i.e., air that flows over an airplane wing with a curved upper surface goes a greater distance than the air flowing along the straight lower surface of the wing, so air flowing along the upper surface goes faster, so has lower pressure than the air going under the wing. This pushes the wing up. (The principle applies to vertical wings, i.e., sails on sailboats and boomerangs.)
- 1738 **Faulty Aether theory debunked only in 1877** **Optics: Benjamin Franklin** and his contemporary **Leonhard Euler**, were the only major scientists who supported **Christiaan Huygens's** wave theory of light, (ref. 1690), which was ignored as it contradicted **Newton's** particle theory. **Bernoulli's** theory of luminiferous aether influenced **Huygens's** wave theory. At the time, it was thought that for light to travel through a vacuum (presumably space) there must be a medium (i.e., aether) filling the void through which it could propagate. (Aether was not debunked until 1877.) **Newton's** particle / corpuscular theory was the most accepted theory until 1803.)
- 1739 **David Hume** **Philosophy: David Hume**, (1711-76) Edinburgh, was born poor. His father died when he was two. Very bright, he entered U of Edinburgh at 12 with his older brother.
He became a lawyer, a Tory, historian, diplomat, and is generally regarded as the most important philosopher to write in the English language. While he is now best known for his philosophy, his fame (and fortune) was based primarily not on his philosophy works but on his six volume *History of England*, (1754-61) which, *inter alia*, described the inhumane effects of religious zealotry.
- Most important philosopher to write in English** At 28, Hume described his intellectual awakening, "I found a certain Boldness of Temper growing in me, which was not inclin'd to submit to any Authority in these Subjects, but led me to seek out some new Medium, by which Truth might be established. After much Study and Reflection on this, at last, when I was about 18 Years of Age, there seem'd to be open'd up to me a new Scene of Thought, which transported me beyond Measure, and made me, with an ardor natural to young men, throw up every other pleasure or business to apply entirely to it." He was not an instant success. From 18 to 28 he studied and read, earning a living for some time as a merchant's assistant.
- Treatise of Human Nature: Hume's is / ought problem** **Hume** then published, anonymously, his first book, *A Treatise of Human Nature Being an Attempt to Introduce the Method of Reasoning into Moral Subjects*. He wrote it from age 18 to 28. It was meant to help establish a science to provide a rational moral code. It said all knowledge comes from impressions and ideas, impressions being more important. We preserve and arrange our ideas in our minds.
One of its major ideas was that one cannot deduce moral conclusions (using words like 'ought') from non-moral premises, his famous is/ought' problem. But there are so many reasonable exceptions (like "X owes Y money; so X *ought* to pay, or X hurt Y; so X *should* pay.) that this theory says little.
- 1739 **Hume** took Locke's 17th century empirical arguments to their logical conclusion (which **Locke** had not) and ended by doubting our ability to *know* anything except that which one learns with

his senses. Thus, he denied God, the self, and the objective existence of logical necessity.

Humans' opinions are based on passion, not reason. Knowledge can't exceed experience (Locke)

Hume argued that human instincts and emotions were more powerful than human reason, that every opinion and value judgment was based, not on reason but on passion (pleasure or pain), a mixture of one's instincts, feelings, and emotions.

Hume said, like **Aristotle**, that all of our knowledge comes from impressions which are more forceful and lively than ideas." That is, knowledge cannot go beyond experience.

"Memory and imagination preserve and arrange our ideas. All knowledge resolves itself into probability. We have good reason to be skeptical of all conclusions reached by the use of reason."

Experience trumps all.

"No concept, not space, time, substance, causality or any other mental category comes before experience." "Students of philosophy ought first to learn logic, then ethics, next physics, last of all the nature of the gods. The psychological basis of religion is fear of the unknown."

David Hume Quotes

"When I hear a person is religious, I conclude that he is a rascal, although have known some instances of very good persons being religious." There was no reaction to the book.

Reason is and ought to be a slave of our passions.

Since **Thales**, Western scientists had said *reason* should guide our actions. **Hume** destroyed that; "Reason is, and ought only to be, a slave of the passions." "Men had never acted from reason. Reason only teaches us *how* to get what we want, but *what* we want is based on our emotions, passions, love, envy, anger, fear." He deflated metaphysical pretensions, made philosophers nervous about their assumptions.

But, science is built on causality & induction & nature's laws

Epistemology: The logical conclusion of **Hume's empiricism** was that there could not be any scientific knowledge. This leads to philosophical skepticism. But, science is built on causality and *inductive inferences* and the regularity of nature. It assumes that our knowledge of particular events in the present gives us reliable knowledge about an indefinite number of similar events in the future.

Since **Francis Bacon** (c.1620s), scientists have used *induction* simply on the grounds that it works. It advanced knowledge more than the more sure *deduction*.

1740 The right to revolt.

Political Theory, ethics: **Hutcheson** (ref. 1725) said people could revolt when their fundamental rights were infringed. (Like **Locke** 1688). The Kirk /Presbyterian establishment disapproved as the idea of "natural" morality downplayed the importance of the *10 Commandments*.

1741-42 On Civil Liberty

Philosophy: **Hume** wrote, "The great end of human industry is the attainment of happiness. For this, arts were invented, sciences cultivated, laws ordained."

Hume's 1742 *Of Civil Liberty* used the phrase "a government of laws, not of Man" (from **Cicero**). (**John Adams** put this phrase in the Massachusetts state *Constitution*.) (more **Hume** 1748, '51, '79).

1744 Islam

Political Theory, Wahhabic Islam: **Mohammed ibn al-Wahhab** founded a fundamentalist Muslim sect, *Wahhabism*. **Mohammed Ibn Saud**, a powerful / sheik, agreed to enforce *Wahhabism* for **Wahhab's** political support. (150 years later, in 1902-32, The **Saudi** family took over Arabia. They enforced *Wahhabism*, still do. They destroyed *Sufi* sacred sites. *Wahhabism* now controls Saudi Arabia as strictly as the Christian Church controlled Europe in the Dark Ages.)

1746 New Theory of Light and Color

Physics, optics: **Euler's** (ref. 1736) *Nova theoria lucis et colorum* / *New Theory of Light and Color* showed that diffraction of light is better explained by **Huygens's** wave theory than by **Newton's** *particle / corpuscule* theory. This further validated **Huygens's** light as waves versus **Newton's** concept. (In 1905, **Einstein** reconciled these apparently contradictory theories of light.)

Angular momentum

Euler's 1st Law of Motion, the linear momentum of a body is its mass times velocity (**Newton** made it his *second Law of Motion*, 1687). **Euler's second law** of motion was, "The rate of change of *angular (spinning) momentum* is the sum of the external moments of force about its axis."

1747 Evolution. Man a Machine

Materialism: Influenced by the spirit of **Newton**, **Julien Offroy de La Mettrie** (1709-51) French doctor, philosopher, published the influential *Man a machine/ L'Homme machine*. Said thought is a property of matter "on a par with electricity." Humans are on a continuum with animals. There are no immaterial substances (like a soul). Matter is animated by natural forces.

1748 The Spirit of the Laws Des L'Epirit des Lois.

Law: **Montesquieu's** (ref.1721) most influential work was the deeply researched *Des L'Epirit des Lois* /*The Spirit of The Laws*. It said law in general is human reason. He sought to find laws of social conduct as solid as **Newton's** laws of motion. He said laws should reflect the culture of the county, its geography, climate, customs, living conditions, and habits.

a feminist	He said <u>disrespect for women invariably was the surest sign of moral corruption.</u> (Women were disrespected everywhere.) "Political liberty is to be found only in moderate governments; and even there it is not always found. (Political liberty) is there only when there is no abuse of power."
Separation of powers	<u>Political Theory:</u> His most important contribution was to explain the importance of the <u>separation of governmental powers.</u> "Every man invested with power is inclined to abuse it. (Same, Burke (1756), Pitt (1770), Acton (1887 "Power corrupts.")). To prevent this abuse, one must distribute <u>power so that power can stop power.</u> " "In the best government there are three areas of power, 1. the legislative; 2. the executive; and 3. The judicial." Hume also favored separation of powers, but undemocratically voting only by persons who owned property (like Locke), limiting the power of the clergy, having annual elections, and unpaid legislators. He preferred a monarchy to a republic. France's absolute monarchy had so undermined France's constitution that liberty was not possible.
Montesquieu quotes:	<u>Why separation of powers?</u> "When the legislative and executive powers are united in the same person. . . there is no liberty; because apprehensions may arise, lest the same monarch or senate . . . enact tyrannical laws, to execute them in a tyrannical manner. . There is no liberty if the judiciary power be not separated from the legislative and executive. Were it joined with the legislative, the life and liberty of the subject would be exposed to arbitrary control; for the judge would be then the legislator.
Separation of powers	
three centers of power	"Were it joined to the executive, the judge might behave with violence and oppression." There would be an end of every thing if the same man, or the same body, whether of the nobles or of the people, to exercise those three powers, that is, enacting laws, executing the public laws, and interpreting the law.
A king is best to enforce laws	<u>The executive power that ought to be in the hands of a monarch,</u> because this branch of government, having need of quick action, is better administered by one than by many: on the other hand, whatever depends on the legislative power, is oftentimes better regulated by many than by a single person.
Slavery debases the master A state needs 3 power centers.	But, if there were no monarch, and the executive power should be committed to a certain number of persons, selected from the legislative body, there would be an end of liberty, by reason the two powers would be united; as the same persons would sometimes possess, and would be always be able to possess a share in both." <u>So there must be three independent power centers.</u> He also said that slavery was so evil that it debased the slave master
1748 Hume's Enquiry on Human Understanding	<u>Philosophy: Hume's Enquiry on Human Understanding</u>), a rewriting of his 1739 <u>Treatise of Human Nature</u> : "Reason is nothing but a wonderful and unintelligible instinct in our souls." He applied Aristotle's second law of thought. (Contradictory statements can't both be true) to religions (the <i>Problem of Contrariety</i> , p. 406-07), that contradictory dogmas of different religions can't all be true and, <i>at most</i> , only one <i>could be</i> true, not that it <i>is</i> true; it merely <i>possibly</i> could be true. (Of course, two contradictory statements <i>can both</i> be false)
Hume, 3 types of statements	In <i>Enquiry</i> , "There are three types of statements. <u>Every statement is either: Type 1. True or false by definition, i.e., logically necessary assertions</u> (2+2=4, a spaniel is a dog) <u>and its negation must be false.</u> To say a spaniel is a dog simply restates the definition of a dog. It tells one nothing new.
Type 1. Logically necessary	Truths of pure reason, like math, are <i>necessary</i> as they exist in a self contained system with no reference to the outside world. So, the <u>truths of pure reason are tautological.</u> Reason alone has no insight into the ultimate nature of things, so can't assert a truth about the ultimate nature of things,
Type 2. Statements of fact say something	<u>Or, Type 2. Statements of fact. assertions based on experience / experiment, i.e., contingent.</u> These contingent assertions may be true, and their negations may be accurate (i.e., X is a doctor). These <u>statements say something meaningful</u> about the world. They can tell something new. <u>Then, only by experiment / experience</u> can statements asserting facts be considered valid.
Type 3. If not type 1 or 2, it's nonsense.	<u>Or Type 3. Nonsense. Any statement not Type 1 or Type 2 is nonsense, says nothing.</u> Metaphysics is just an exalted form of mythology. Of no relevance to the real world., <u>The only meaningful statements are type 2 statements of fact and of the relation of ideas.</u> Statements that state a "relationship between ideas" align as analytic, necessary, <i>a priori</i> , whereas truths by "states of actualities" (concrete) are always contingent, <i>a posteriori</i> , proven.
1748	<u>To Hume, most statements in theology are not necessarily-true-Type 1 statements, or based on experience / experiment, Type 2.</u> So they are <u>Type 3. nonsense, useless.</u> They tell one nothing.

The claim, "God exists." is neither necessarily true, Type 1. (as its denial isn't necessarily false), nor Type 2, based on experience / experiment); so it's Type 3, nonsense, outside the domain of knowledge. "Disregard any treatise with statements that are not Type 1 or Type 2. Such statements are sophistry and illusion." His empiricism made all experience contingent, that is, it may or may not be true.

Hume on Miracles **Hume's** *Essay on Miracles* is *Section 10 of Human Understanding*, "There has never been in all of history a bona-fide verified miracle. The Christian religion not only was at first attended with miracles, but even to this day cannot be believed by any reasonable person without one."

Miracles don't happen This essay answered the *Argument From Miracles / Religious Experience* (I saw / spoke-to God, so God exists). "Is this evidence of God or merely evidence of someone's belief?" "Upon the whole. . . it appears that no testimony for any kind of miracle has ever amounted to a probability, much less proof. Miraculous "experience is unique, irrefutable by reason, non-falsifiable, and unreliable." **Hume** said to argue from the problematic evidence of this world to a certain existence of a good and omnipotent Christian God was a philosophical absurdity.

Miracles don't happen **Hume**, "No Testimony is sufficient to establish a miracle unless the testimony be of such a kind that its falsehood would be more miraculous than the fact which it tries to establish. . . .
"The only way a proposition can be proved by logic and the meaning of words alone is for its negation to be (or lead to) a contradiction." "Always reject the greater miracle. . . . What is more likely, that God spoke to someone or that the report was mistaken?"

1749 **Physics: Emile du Chatelet** (ref 1734-35, '38) published the only French translation of *Principia*. Reading it, she deduced the law of *Conservation of Energy*, which also became the First Law of Thermodynamics. (See 1831-Faraday)

1749 **Geology, biology, evolution: Georges LeClerc, Comte de Buffon** (1707-88), French, wrote *Historie Naturelle*, 44 volumes. *Volume 1* (1749) posed an evolutionary origin for the Earth, that a molten ball cooled, similar to ideas of **Kant** (1755) and English geologists.
Early statement of evolution - This was the first book to treat geology and biology scientifically. Fossils were evidence of animal and extinct species. He defined a species as a group of animals that can interbreed, the distinction used today.. He suggested there was a common ancestor for Man, apes, and quadrupeds. Useless organs (like the appendix) showed change had taken place. He said the Earth could be 35,000 years old.

Evolution **Catholics retaliated: Buffon's Historie Naturelle was the first Western history of life**
Forced to recant and the Earth not based on the Bible. The study of geology shattered the *Bible's Genesis* description of how the world was formed. So, Catholic Sorbonne (Paris) theologians forced Buffon to recant ignominiously, to say, "I declare that I had no intention to contradict the text of Scriptures; I believe most firmly all therein about the creation both as to order of time and matter of fact. I abandon everything in my book about the formation of the Earth, and generally all which may be contrary to the narrative of **Moses**."

Biology: Ernst Mayr, evolutionary biologist, said, "**Buffon** was not an evolutionary biologist, yet he was the father of evolution. He was the first to discuss a large number of evolutionary problems"

Wesley, Methodist: **Methodism, Street preaching: John Wesley** (1703-91), a pious Anglican priest, influenced by **Tomas a Kempis's Imitation of Christ** (1428), opposed **Calvin's predestination**. The Church of England had largely become a lethargic church for the "cultured" and the wealthy. So **Wesley** began preaching in workhouses, village streets, and open fields, to reach the common people.

He gradually gained many followers. Like the early Christians, **Wesley's** preaching radically changed thousands of lives, including "witches" as he said, "Giving up on witchcraft is, in effect, giving up on the *Bible*." He agreed with **Luther, Bede, and Lombard** that **Adam's** fall caused some animals to be dangerous or poisonous..

Original sin causes earthquakes He authorized lay preachers to spread his ideas, heavy on social justice. An abolitionist, he founded chapels, eventually sending missionaries to America. His gospel of radical saving grace upset established churches in both England and America. While he thought himself an Anglican, his movement became the Methodist Church. A firm believer in the *Bible*, he said that earthquakes and carnivorous animals were caused by Adam's *Original Sin*.

1750-99 *Nationalism American, French, and Industrial Revolutions*

An eventful period in Western history. Three revolutions

Overview: *The Enlightenment* (c.1650-c.1800) reduced the power of Christianity in Europe.

In the West, life expectancy in 1750 was around 38 at best. Almost all were desperately poor.

The last half of the 18th Century was a period of revolutions for the very few educated.

Hume distrusted causality. He caused a new tone in philosophy.

Diderot's *Encyclopedie* spread knowledge; atheism went public.

Samuel Johnson standardized the English language. Beccaria caused reforms in the penal system.

Voltaire infused a new skeptical attitude among the educated.

Blackstone's *Commentaries* modernized law wherever English was spoken.

The US gained independence with the help of England's enemy, France. France killed its nobility.

Nationalism developed c.1750.

Political Theory, nationalism: Hans Kohn (1891-1971), of Prague, Bohemia, said that modern nationalism developed around 1750. Previous "nations" were but family conquered lands. He wrote, "Nationalism, taking the place of religion, is as diversified in its manifestations and aspirations, in its form and even its substance as religion itself." Like religion, nationalism is an effective social control.

Nationalism is the primary force in the Western State System.

Frederick Schuman (ref. 1532), "The outstanding and distinctive characteristic of the peoples of the Western State System is their devotion to the "nations" into which they have got themselves divided. . . the Western World is a world of nations."

Nationalism shapes the attitudes and actions of its members toward each other. [Most, not all] persons are influenced more in their emotions and behavior by a sense of national solidarity. . . than any other factor. . . Not religion, not tribe, not family, not race, not ethnic, or political party affiliation. It is a cult among western peoples"

Toynbee called nationalism "a false and maleficent religion."

Nationalism gives meaning to lives.

Political Theory, nationalism: The yearning for a meaning to one's life is one of the fundamental differences between humans and lesser animals.

Patriotism

Schuman: "Nationalism fulfills one great task—giving meaning to Man's life and justifying his noble and ignoble passions before himself and history, lifting him above the loneliness and futilities of his days, and endowing the order and power of government, without which no society can exist, with the majesty of true authority."

This is my own, my native land

Sir Walter Scott (1751-1832) in 1805, "Breathes there the man, with soul so dead, who never to himself hath said, this is my own, my native land." (See 2015-Psychology, what motivates man).

1750

Nationalism: No emotion unifies a group so readily as hatred/fear of a common enemy. England, Germany, France, Spain, Holland, Italy, Switzerland, the US, Austria, Sweden, Denmark, and South American countries, all attained unity by fighting their colonial masters or foreign enemies.

Nationalism shares with religions a fear of dissent, and so rulers prosecute dissent ruthlessly.

Patriotism motivates the masses. Status motivates the rich

Schuman and other scholars have demonstrated how rulers hypocritically use religion and nationalism / patriotism to control their subjects. (see 1532). For the very rich, however, the two most powerful motivating forces are money and social status; patriotism and religion are simply sentiments useful to control the masses. Money and property overrule even patriotism/nationalism and religion.

Blackstone (1753) and Locke, described how in the West property was absolutely sacred.

1750

"Nobility is a fraud. You were born, nothing else."

Political Theory, democracy: Pierre-Augustin Beaumarchais (1732-99) French polymath, was, variously, a watchmaker, inventor, playwright, musician, diplomat, spy, publisher, horticulturist, arms dealer, satirist, financier, and revolutionary (both French and American).

He criticized the concept of nobility. He said, "Nobility, wealth, rank. . . What have you done to deserve so many advantages? You were born, nothing else." His words had little effect.

Nobles were unfazed. Bishops & nobles supported each other to control the peasants. Lords

often used Jews as their tax collectors, so peasants disliked Jews, but stayed loyal to the lord.

Balance of Power doctrine explained

Political Theory: “The Western state system rests on state sovereignty, the principles of international law, **and the politics of the balance of power**, namely, if any one state becomes so strong it endangers other states, the other states will join to stop it.” (**Schuman**) “Three conditions are needed for a modern state, a stable and accountable government, and the rule of law.”

1750 Astronomy: **Thomas Wright** (1711-86) English astronomer, mathematician, instrument maker, architect, speculated that the *Milky Way* was a flattened disc of stars. He was the first to speculate that faint nebulae were distant galaxies far beyond the Milky Way.

Romantic Love; a Western concept

Psychology, romantic love: The concept of romantic love, first sung by troubadours in the 12th century, became widely accepted in the Western middle class, largely by women. For many, romantic love is real and gives happiness. It never spread beyond the West. Hindus, Chinese, Malays, Koreans, Japanese do not have a name for it. The East has desire, affection and recipes for physical pleasure (*Kama Sutra*), and family attachments, but not the moral anxieties, ideal passions, guilt feelings, nostalgia, and obsessions described in Western literature.

Thoughts on romantic love

George Sand, pen name of **Amantine-Lucile Aurore Dupin** in 1862 said, “There is only one happiness, to love and be loved.” **Robert Louis Stevenson**, “Falling in love is the one illogical adventure, the one thing of which we are tempted to think as supernatural, in our trite and reasonable world.” For **Margaret Mead** (*Coming of Age in Samoa*, 1970), more worldly, said, “Love is the invention of a few high cultures, independent of marriage—it’s a cultural artifact.”

1751 Enquiry regarding Morals

Ethics: **Hume** (ref. 1739, ‘48) *An Enquiry Concerning the Principles of Morals*. Its purpose of ethical inquiry was to discover the universal principles on which moral praise and blame were based. Benevolence is approved partly because of human sympathy and partly because of its social utility, but justice is approved of for its utility alone.

Hume: “Holiness problem” All theodicies fail.

This Enquiry pointed out the fatal fail of all theodicies that assume a God and attempt to justify evil or suffering, the “holiness problem” theodicies, “All [such] theodicies have in common that suffering is necessary precondition or outcome of some greater good (ref. 1710). Saying evil is good is nonsense. It is contrary to human experience. The distinction between good and evil depends on the human mind and can’t be altered by some philosophical theory or speculation.”

The Problem of Suffering

He said. “If the [suffering] in the world is intended by God, He is not good. If it violates his intentions, he is not almighty. If only God can create, he must have created evil and suffering. If somebody else (Satan) created [suffering], how can one know that God, not Satan created the universe?”

Hume killed the Hidden Reasons Defense

Hume also answered **Leibniz’s** “*Hidden Reason*” defense against the *Problem of Suffering*, “If God can justify a suffering for a reason incomprehensible to Man, what can the most moral religious man know what God wants?” Man also couldn’t know if God had *no* reason. And, if one can’t know God’s reasons, he can’t make any *authoritative* statement about God, good or bad.”

A God that doesn’t act like a God isn’t a God
1751

With the rise of humanism where a God is not automatically assumed, skeptics began to say that the only way a proposed God could refute *The Problem of Suffering* would be to do God-like things and demonstrate his God-likeness. Since certainly a God that does not act like a God (in this case by preventing needless or pointless suffering of innocent people) is not a God. The only way a God can be considered omnipotent and benevolent is if He acts omnipotently and benevolently.

Theists must prove all suffering has been necessary

Hume: “All anyone has to do is show that the theist can’t prove that every evil and suffering people have endured has been necessary and not pointless, until then, there’s no reason to infer a perfect God.” “If one holds, as a matter of ethics, that there should be no unnecessary suffering, The Problem of Evil/Suffering refutes traditional theism.”

Hume: One scintilla of needless suffering negates a perfect God

Hume argued that “if we accept the reality of evil we are in no position to infer God is perfect goodness.” **Hume’s** point was not that suffering proves God can’t be both omnipotent and perfectly good, but that we can’t know that God will rectify the situation. We may hope so, but there’s no evidence for it. So, “any scintilla of unnecessary or gratuitous suffering defeats a perfect God.”

Bertrand Russell later said that after **Hume** destroyed *empiricism*, unreason, i.e., *Romanticism*, grew; and that “**Rousseau** (1754) was mad but influential, and **Hume** was sane but had no followers.”)

Free Will Free will has been described / defined many ways, from the theoretical to the realistic. Spinoza had said that man had no free will. The Church could not reasonably tell people not to sin unless they had free will. Whether humans have free will depends a great deal on how one defines it, i. e., actual or theoretical. Our ethical codes and religion are based on the idea that humans have free will. God limited all humans' *free wills* when He told Adam and Eve that they didn't have the free will to eat the fruit from the tree of knowledge. Virtually all theologians and philosophers have historically said our civilization is based on a widespread belief in free will.

Do people have free will? **Yes** Pelagius (AD 415), a Welsh cleric. "The glory of the rational mind is based on the freedom to choose [good or evil]. This is the whole honor of our nature."

Irenaeus (AD 186), God gave man free will. Genuine human perfection can only come through his *free will* and achieving spirituality through suffering.

Origen, The Church teaches clearly that every rational soul has free will and volition.

The Catholic Catechism, 1711, [Man is] endowed with a spiritual soul, with intellect, and *free will*.

C S Lewis, God gave man total libertarian *free will*. Francisco de Vitoria, "God gave Man *free will*."

Franz Kafka, "You are free and that is why you are lost."

The Catholic Catechism: "Endowed with a spiritual soul, with intellect and *free will*, the human person is from his very conception ordered to God and destined for eternal beatitude."

Yes Descartes, Without *free will* there would be little incentive to act morally. That we have *free will* is evident.

John Duns Scotus was a strong defender of the notion that people have libertarian *free will*.

Christopher Hitchens, "Yes, I have *free will*; I have no choice but to have it." (**Sartre**)

Dante made Albertus's doctrine of *free will* the basis for his ethical system.

Immanuel Kant, "A *free will* and a free will subject to moral laws are one and the same." "If we are not free to choose, then it would make no sense to say we ought to choose the path of righteousness."

Do people have free will? **It depends** Plato, "A man is free when the rational part of his soul governs his feelings and his passions."

Epictetus, "Only the educated are free. No man is free who is not master of himself."

St. Ambrose, "The wise man is always free." Adlai Stevenson, "A hungry man is not free."

Thomas Aquinas, "A man has free choice to the extent that he is rational."

(1751) Jean Jacques Rousseau (1754), "Liberty is obedience to the law which one has laid down for oneself."

Samuel Johnson, "All theory is against freedom of the will. All experience for it."

John Locke "We should not ask whether our will is free, but *if we are free*, for our idea of freedom is the power of acting according to our will or the consciousness of knowing when we do something whether we could have done something else." "All men" are naturally in. . . a state of perfect freedom to order their actions, and dispose of their possessions and persons as they think fit, within the bounds of the law of Nature, without asking leave or depending upon the will of any other man."

As previously noted, Locke was a hypocrite. His "all men" *really* meant "all free White males."

He was a major owner of the British slave trading company and the *Constitution* he wrote for a colony in Carolina, stated, "Every freeman shall have absolute power and authority over his negro slaves. (1669).

Free will? It depends Voltaire, The will is not a faculty that can be declared free. "*Free will*" is a senseless expression and what the scholastics called *free will*. A man is free the moment he wishes to be."

"Man is a free agent. Were it otherwise, the priests could not damn him."

Sigmund Freud, *Free will* is far stronger with trivial decisions than with weighty ones. With weighty ones we commonly feel that our inner nature compels us, that we really have no alternative. With trivial decisions, however, for example, the arbitrary choice of a number, we discern no motive and therefore feel it is an uncaused act on the part of our ego.

Author: We evolved from lesser creatures. So we have the same *free will* as any creature, from lion to field mouse. Like lions and field mice, our actual *free will* depends on circumstance.

Most people, by circumstance, poverty, education, mental and /or physical ability, disease, or ability to have little *free will* by any measure. (See p. 396, obstacles to clear thinking) .

Do we have free will? **No** Augustine, Free will is an illusion as God can grant or withhold it.

Euripides, "No man is truly free. All are slaves of money, necessity, public opinion, or fear of prosecution forces each one, against his conscience, to conform. To the lowly, the rich and powerful are as gods."

Erasmus, As God knew that every man and all men would commit evil and cause suffering, God shares the responsibility for the suffering.

Spinoza, There is no such thing as free will. Is a will free when exercising it may doom one to eternal torture?

Martin Luther, God's foreknowledge and omnipotence utterly destroyed the doctrine of *free will*.

Johann von Goethe, "No one is more enslaved as those who falsely believe they are free."

	Charlotte von Stein, muse of Goethe, “we think we are acting of our own volition, but when we look more closely we see they are only the intentions and inclinations of the age which we must comply with.” Stephen Cave 2016, “There’s no such thing as free will . . . but we’re better off believing in it anyway.” Albert Einstein, “<u>Everything is determined, the beginning as well as the end, by forces over which we have no control.</u> It is determined for the insect, as well as for the star. Human beings, vegetables, or cosmic dust, <u>we all dance to a mysterious tune</u>, intoned in the distance by an invisible piper.”
Do we have free will? <u>No</u>	Karl Marx, “Men make their own history, but they do not make it as they please.” Einstein paraphrased Arthur Schopenhauer, “Man can do what he wills, but he cannot will what he wills.” Lamine Pearlheart, “A god that created me free and autonomous, yet tells me how and what I should think.” Bertrand Russell, “Psychology & physiology, in so far as they bear upon <i>free will</i>, tend to make it improbable.” Niclas Berggren, <i>Original Sin</i> causes man to sin, so man doesn’t have total <i>free will</i>, so God is responsible.
(1751)	Nikola Tesla, “We are automata entirely controlled by the forces of the medium being tossed about like corks on the surface of the water, but mistaking the resultant of the impulses from the outside for <i>free will</i>.” He wrote, “Science is opposed to theological dogmas because science is founded on fact. To me, the universe is simply a great machine which never came into being and never will end. The human being is no exception to the natural order. Man, like the universe, is a machine. Nothing enters our minds or determines our actions which is not directly or indirectly a response to stimuli beating upon our sense organs from without. [W]hat we call ‘soul’ or ‘spirit,’ is nothing more than the sum of the functionings of the body. When this functioning ceases, the ‘soul’ or the ‘spirit’ ceases likewise. . . This apparently mechanistic conception is not antagonistic to an ethical conception of life.
Do we have free will? <u>No</u>	Saul Smilansky 2002, <i>Free will</i> does not exist and it would be harmful if people knew it. Determinism not only undermines blame, it undermines praise. Sam Harris, There’s no such thing as <i>free will</i>. We are better off without the whole notion of it. We need our beliefs to track what is true. What evidence could possibly show that one could have acted differently in the past? <u>Illusions, no matter how well intentioned will always hold us back.</u> Our wills are simply not of our own making. Thoughts and intentions emerge from background causes of which we are unaware & over which we exert no conscious control. We do not have the freedom we think we have.
Do we have free will? <u>No</u>	Thomas Huxley, “The doctrine that all persons are, in any sense, or have been, at any time, free and equal, is an utterly baseless fiction. “ Anatole France, <i>Free will</i> is but an illusion. Sir Francis Galton, our ability to make “free” choices is determined by our biological inheritance. Jerry Coyne, “Recognizing there is no <i>free will</i> makes one more empathetic, less judgmental Will Durant, “<u>We are all born unfree and unequal</u> subject to our physical and psychological heredity, and to the customs and traditions of our group, diverse in health, strength, mental capacity and qualities of character. <u>Inequality grows as society becomes more complex as exceptional people take advantage of every invention and discovery to become more unequal, the strong become stronger, and the weak, relatively weaker.</u> <u>The concept of free will permeates our culture, in law, in ethics.</u> Since Darwin and Galton, advances in science have tended more and more to show circumstances that heavenly influence our thinking.”
Do we have free will? <u>No</u>	Robert Sapolsky, There’s no free will. The belief that humans have free will frees God of all responsibility for anything his creatures do. Jeremy Bentham, Nature determines everything we do.
Opinions regarding Free Will	William James “My first act of <i>free will</i> will be to believe in <i>free will</i>. ” Kedar Joshi, philosopher, “Christianity would be helpless without the idea of <i>free will</i>.” Claudia Gray / Amy Vincent, “Where there’s no <i>free will</i>, there’s no sin.” Mark Twain, If God created Man, it was with a propensity to sin. It is then ludicrous to punish Man for sinning. John Stuart Mill, Freedom is pursuing our own good in our own way, so long as we do not attempt to deprive others of their <i>free will</i> not to suffer. “Couldn’t God have evened things out a bit?”
Opinions regarding Free Will	Someone with little actual <i>free will</i> can still believe he has <i>free will</i> and still feel guilt. Carl Jung, “<i>Free will</i> is doing gladly and freely that which one must do.” Peter van Inwagen, 2002, a former president of the <i>Society of Christian Philosophers</i>, If determinism is true our actions are not free and our actions are random & our will cannot be morally responsible for them. Isaac Bashevis Singer, We must believe in <i>free will</i>. We have no choice. Roy Baumeister: “Students with a weak belief in their <i>free will</i> were less likely to volunteer to help a classmate or to give money to a beggar or lend their cell phone to a classmate or commit to a relationship.” Bruce Waller, philosopher, <i>Restorative Free Will</i>, says free will and determinism are not opposites, they just describe our behavior at different levels. We should in any given situation, think and weigh our options. Benjamin Libet, physiologist, in the 1980s may have shown that electrical activity in the brain builds up before one consciously decides to take an action. This suggests determinism, but the time between

involuntary brain activity and the participant's recording of his thought was a weakness in the procedure

- (1751) **Mackie** (1955) "The concept of Libertarian free will (the free will argument) is dangerous as it must include the possibility that men will do evil (cause suffering) at every chance as well as the possibility that some men will do good at every chance."

Howard Zinn. Acting as if we are free is a way of resolving the paradox of determinism and freedom.

Jeffrey Rosen, We may not have *free will*, but we have free won't, the ability to overcome our impulses.

Free will defense to the Problem of Suffering

Free will vs. the Problem of Suffering: **Irenaeus** (ref. AD 177), **Leibniz** (1710), **C S Lewis** (1940), and **(Plantinga** (1977, '93) cited *free will* to refute *The Problem of Suffering*. Namely, suffering is inevitable as God gave people *free will* and He will not interfere with someone exercising his free will. As we have noted, an omnipotent God could *prevent* suffering.

Hume destroyed the Free Will defense

Hume: "The *free will defense* must assume that every act of free will, in and of itself, is worth more than any possible needless or pointless evil that its exercise may cause."

The *free will defense* is also refuted by experience; [dead babies, wars, torture, plague, slavery], and saying that God couldn't create humans with *free will* who always freely chooses to do good makes God not omnipotent, i, e, not a "perfect" God." So a perfect God couldn't exist.

Hume problems with the free will defense:

Hume also gave three independent arguments refuting the Free Will defense:

1. The *free will defense* applies only to the suffering wilfully inflicted by someone on another, [cruelty, torture, murder], so-called *moral evils*, but not to *natural sufferings* not caused by humans [famine, plagues, earthquakes), that afflict all people [also known as "acts of God.]"

1. It's limited to human caused sufferings

Demons do it? Some persons using the *free will* defense have said that demons cause *natural evils/sufferings*. That would make the God who created the universe at the mercy of some lesser supernatural being like a demon. Such argument would void the whole concept of God's omnipotence.

The argument that natural evils/sufferings are retribution for man's sinfulness is refuted by the fact that naturally caused sufferings (plagues, etc.) harm everyone, from the most pious to the most evil.

2. God favors an evil-doer's free will

2. Victim's free will: When someone exercising his *free will* causes another to suffer, there are two *free wills* involved, the evil-doer's and the victim's. The usual answer to this is that God doesn't intervene as that would defeat the great concept of *free will*. What such answer in practicality means is that God chooses the *free will* of the stronger over the *free will* of the weaker.

Robert Ingersoll (1870) echoed **Hume's** argument. He asked, "When [God] heard the lash upon the naked back of the slave, why did He not also hear the prayer of the slave? And when children were sold from the breasts of mothers, why was He deaf to the mother's cry?"

3. God does intervene

3. The *Free Will* defense misstates biblical history. The Bible says God does intervene. He created the universe and everything in it. He delivered loaves and fishes to man, He turned water into wine, parted the Red Sea, gave the *Ten Commandments* to **Moses**, healed persons, did miracles.

Religions are sick men's dreams

Religion: The tendencies of theism that concerned **Hume** were its intolerance and opposition to liberty, its distorted moral standard and its willingness to allow suffering in the name of God.

Hume said, "Examine the religious principles which have, in fact, prevailed in the world. You will scarcely be persuaded that they are anything but sick men's dreams."

Hume, "Generally speaking, errors in religion are dangerous; those in philosophy only ridiculous."

The dark side of the Enlightenment. White supremacy

During the *Enlightenment*, white Europeans discovered and conquered much of the world.

Hume said, "I suspect that the Negroes to be naturally inferior to whites. There scarcely ever was a civilized nation of that complexion, even any individual eminent either in action or speculation." Many other important *Enlightenment* men thought the same, including **Locke**, **Voltaire**, **Linnaeus**, **Kant**, and **Jefferson** (although after speaking to **Benjamin Bannister**, a Negro polymath, changed his mind. **Bannister** was appointed to plan Washington DC.)

1751-72 Encyclopedie, the most important publication of the Enlight-

Denis Diderot (1713-84), was founder and editor of the Encyclopedie ou dictionnaire raisonne des sciences, des arts, et de metiers: (**Jean Baptiste le Rond d'Alembert** was co-editor until 1758), a vast project, heavy on medical articles, with over 74,000 articles, 20 million words, 160 authors, 100 consultants. **Diderot** managed it. It was a compendium of the new scientific thinking and the flagship publication of the *Enlightenment*, critical of both organized religions and France's despotic king. It said that the teachings of the Church could not be considered

enment authoritative regarding scientific matters. It said that slavery was illegitimate.
The first issue declared its debt to **Galileo, Newton, and Locke**.

Diderot and d'Alembert, with contributors including **Voltaire, Rousseau (1754)**, and **d'Holbach** (1761), were the guiding spirits of the *Enlightenment*, centered largely in Scotland and Paris.

It was published from 1751 to 1772 in 28 volumes. It printed articles about workmen and artisans alongside of articles of the highborn. It helped democratize scientific knowledge.

Its goal was to transform society. 25,000 sets were sold by 1789, half outside France.

Due to its revolutionary disruption to the existing aristocratic society and authority, most of the volumes were printed secretly. **Louis 15** had the Council of State ban it in 1759 after seven volumes.

They defined an Enlightenment thinker as "one who trampling on prejudice, tradition, universal consent, authority, in a word, all that enslaves most minds, dares to think for himself".

Skeptic Diderot wrote of persons "going thru a dark forest guided only by the small lantern of reason; and the clergy said, "Put the light out." "A thing is not proved because no one has ever questioned it."

Diderot "Skepticism is the first step towards truth." He was the foremost theoretical exponent of the experimental method in the Age of Reason. He was a prolific writer, contributing to several journals, including one on European colonialism. He wrote until he died.

Diderot Quotes Like many *philosophes*, **Diderot** disdained Jews. He was first a deist, then an atheist. Said, "Let us strangle the last king with the guts of the last priest." (attributed also to **Jean Meslier** 1729), and "Islam is the enemy of reason. Fools have been and always will be the majority of mankind." (Several have opined similarly, like **Russell** and **Francis Bacon**. See "Fools" in the Index).

Edinburgh Review *Enlightenment*: In the English speaking world, the quarterly *Edinburgh Review* was the most influential journal. Scots **Hume, Adam Smith** (1776), **Hutton** (1788), and **Ferguson** (1767) became the first intellectual celebrities of the modern world. The Enlightenment was Lockean in that it was based on the idea that all knowledge came from real world experience, not scripture.

The Enlightenment was limited to the intelligensia. It was limited to the intelligensia. It brought back Greco-Roman ideas of democracy. The *philosophes* wanted to unite science and technology to benefit all. The feudal churches and nobility resisted, citing the *Bible*. The *Enlightenment* fundamentally shaped centuries of European history.

1752 Franklin, an all-around genius **Benjamin Franklin** (1706-90), (ref. 1738) born poor in Boston, attended Boston Latin School (founded by Puritans) for two years. He apprenticed at 10 to his brother **James**, a printer; and became a master printer. He became also a leading writer, political philosopher, politician, Freemason, postmaster, scientist, inventor, civic activist, statesman, and diplomat (spoke French). He was a major figure in the American *Enlightenment* and the history of physics for his discoveries and theories regarding electricity.

Franklin Inventions From 1732-58, he printed the popular *Poor Richard's Almanack*, which spread household hints, puzzles, weather, aphorisms, "Early to bed, early to rise. They that give up essential liberty to obtain temporary safety deserve neither liberty nor safety." In 1742, he invented the energy efficient cast iron **Franklin** stove. In 1749, he said lightning was electricity. In 1751, he invented bifocals and the lightning rod. The French used them. He became wealthy from his enterprises. Said every good invention needs a system implementing it.

One of the very first to study electricity Physics, electricity: In 1752, **Franklin** flew a kite in a thunderstorm. An electric charge flowed down the wet kite string. It confirmed that lightning was electricity. He saw there were two opposite and complimentary kinds of electric charges; named them positive and negative. Matter consists of equal numbers of positive and negative charges (later found to be protons and electrons). He showed electricity can magnetize forces of attraction and repulsion between two charged bodies. He guessed (correctly) that electricity came in discrete particles. (Electrons were not identified until 1897.)

Franklin He showed that a conductor can draw an electric charge from a charged body & that an electric charge can produce magnetism. However, no one yet knew how to produce a long lasting flow of electric charge. He stated that an electric charge could be neither created or destroyed, i.e., a law of conservation. This was the first law of conservation (and of thermodynamics).. Such laws are central in science.

The social effect of slavery Slavery: Some colonists, not necessarily slave owners or abolitionists, feared that the increasing number of slaves would be detrimental. **Franklin** in 1751 said that the growing number of slaves would sap the American white's spirit of industry and leave them "enfeebled." That in white families with slaves, the children being educated in idleness would become proud, disgusted with working.

Some others feared the more slaves would discourage poor Europeans to immigrate.

China once was great but then stagnated
Chinese had moral values without a god
1753 **Voltaire's *Histoire universelle*** said China was the first great civilization, with silk, paper, porcelain, clocks, gunpowder, printed money, printing, and distance navigation long before Europe. He blamed China's intellectual stagnation, and thus its decline vis-a-vis Europe, to its excessive reverence for tradition and to its complex written language which severely restricted the number of people who could learn to read and thus educated.
Voltaire and some philosophes did publicly praise the Chinese sages whose morality was unquestioned without being based on religion. *Histoire Universelle* was expanded several times during his lifetime with more chapters and given different names

Christians Pagans same?
1754 **Christianity:** Anglican Bishop of Bristol **Thomas Newton** described many Christian practices taken from Paganism, incense, sprinkling holy water, lighting candles. Said, "Is not the worship of saints and angels the same as the former worship of demons? The name only is different. The thing is identically the same."

Discourse on the Origins and basis of the Inequality of mankind
Philosophy, the Romantic Movement: **Jean Jacques Rousseau** (1712-78), born in Geneva, a city-state. He was influential in causing the character of the French Revolution. Born Catholic, he became a deist. He sparked the *Romantic Movement's* reaction to **Newton's** materialistic reason.
Go back to nature to cure society's ills. **Rousseau's *Discourse on the Origins and Basis of the Inequality of Mankind*** argued that people had adopted laws and government to preserve their private property (a *social contract*), but that in doing so they had become enslaved by government. Also that people had certain "inalienable" rights that the state could not abrogate

Subjugation of women is natural as men are stronger
He said that cultivating the arts and sciences was pandering to the luxury and idle curiosity of the rich, who thrive on the miserable toil of the masses. He denounced as a wicked fraud the whole social system, whose governments sustain exploitation and oppression, but also that the law of Nature justifies the subjugation of women as men are stronger.
"To be sane in a world of madmen is itself a kind of madness." (more **Rousseau** at 1762)

Thoughts on the Interpretation of Nature
Scientific Method: **Diderot** (ref 1751-72) published *Thoughts on the Interpretation of Nature*. Said, "We have three principal means [of finding truth], observing nature, reflection, and experiment .
We have distinguished two kinds of science, experimental and rational. The rational has its eyes bandaged, proceeds feeling its way, [The other], experiment, infinitely multiplies its movements. It is always in action. It sets about seeking phenomena all the while that reason looks for analogies."

1755 **American Indians:** The Massachusetts General Court (legislature) placed a bounty of £40, a huge sum, for the scalp of a male adult Indian, £20 for the scalp of a female Indian or male under 12. In 1756, Canada offered £25 for male Indian scalps.

Air is several gasses
Chemistry: Joseph Black, French-Scot, discovered that air was not one gas but made up of different gasses. Thus gas was shown to be a *state* of matter like solid and liquid (and plasma, discovered much later) not a particular matter. He was the first to isolate pure CO₂ and nitrogen

"a crime to think"?
1755 **Epistemology: Samuel Johnson** (1709-84) published the *Dictionary of the English Language*. It standardized English spellings. It had detailed definitions, etymology, and numerous quotations from notable authors and thinkers of the time. Said, "He who praises everybody praises nobody."
"The Roman Church, which gains, by confession, the great opportunities of human nature, has generally determined what is a crime to do, it is a crime to think."

Samuel Johnson Quotes
"It is better to live rich than to die rich. Curiosity is one of the permanent certain characteristics of a vigorous mind. Language is the dress of thought. One of the disadvantages of wine is It makes a man mistake words for thoughts. Knowledge is of two kinds. We know a subject ourselves, or we know where can find information upon it."
"How is it we hear the loudest yelps for liberty among the drivers of Negroes?" 1775

An "Act of God"
1755 **Catholicism:** On November 1, All Saints Day, a major Catholic holy day, an earthquake and tsunami destroyed most of Lisbon, its most important churches, and killed 10,000-100,000 Catholics.
It was a huge emotional shock to Catholics across Europe. Catholic clerics said it was a "divine judgment." (Blaming the victim). To call it a "divine judgment" was nonsense in any case as Lisbon's red-light district was barely affected. (In 1759, **Voltaire** wrote *Candide, ou l'Optimisme / Candide, or Optimism*, his best known work, largely to ridicule **Leibniz**, wherein *Dr. Pangloss* mouthed foolish

Leibniz-like bromides. Candide, the innocent, said, "If this is the best of all possible worlds, what are the others like?" **Voltaire** cited the Lisbon disaster to ridicule **Leibniz's** claim that God made the "best of all possible worlds." He said the tsunami proved that our world was not the best possible world.)

Kant: Hume woke me up 1755 **Philosophy: Immanuel Kant** (1724-1804) (ref. 1076, 1686, 1734, '49), born poor, greatest German metaphysician and transcendental philosopher. He taught logic, geography, and metaphysics at Koenigsburg for 46 years. He was the founder of German idealism. He synthesized early modern rationalism and empiricism, set the terms for much of 19th and 20th century philosophy,

The Enlightenment was man's leaving from his self-imposed infancy.

Kant said the *Enlightenment* was the emergence of man from his self-imposed infancy, the inability to use one's reason without the guidance of another."

He said that **Hume** "awakened me from my dogmatic slumber (of orthodoxy)." He disputed **Descartes's** doubts and preferred intuition. He made Germany an intellectual power.

Many philosophers have called **Kant** the central figure of modern philosophy. Like all natural philosophers, he agreed with **Plato's** statement, "All propositions must have a reason."

Kant set the tone for 19th century philosophy

Kant said history was a record of Man's moral progress who wanted to establish principles based on universal rationality. He defined *The Enlightenment* as "Man's leaving his self-imposed infancy (the inability to think for oneself without the guidance of another. . . man's release from his self-incurred tutelage when its cause is not in lack of reason but in lack of resolution and courage to use it without direction from another." *Sapere aude!/Have courage* to use your own reason.

1755 That is the motto of the *Enlightenment*." There are three juridical attributes that inseparably belong to the citizen, 1. constitutional freedom, 2. civil equality, and 3. political independence.

Extremely influential, **Kant** combined **Leibniz's** and **Hume's** skepticism into his "critical philosophy," that ideas do not conform to the external world, but rather the world can be known only insofar as it conforms to the mind's own structure. He called God a "necessary being."

Objective moral law.

Kant believed that our knowledge of the world was in two types, 1. phenomena, which are our direct sensations (what goes on in your head) and 2. *noumena* (their objective causes).

Morality needs a belief in God

Some of course believe that history provides certain necessary moral principles. For such, he said that there is an objective moral law, known to us not by experience but by reason; that morality required a belief in God, freedom and immortality, although these cannot be proved scientifically or metaphysically; and that the human mind is the origin of the world as we know it. Said, "If we are not free to choose, then it would make no sense to say we ought to choose the path of righteousness."

General Natural History and Theory of the Heavens.

the nebular hypothesis

Cosmology: Kant's General Natural History and Theory of the Heavens was his first major work.

It posited a *nebular* hypothesis of the origin of stars and planets; namely that the group of stars that Earth was in might be a rotating body of a huge number of stars held together by gravity.

Also that our solar system had evolved from a globular mass of incandescent gas rotating around an axis through its center of mass. As the mass cooled, it contracted and successive rings broke off which in their turn cooled and became planets, while the Sun at their core remained.

So, that the outer planets of our solar system were older than those closer to the Sun.

(In 1734, **Swedenborg** had suggested this theory. In 1796, **Laplace** also suggested a *nebular* hypothesis.)

Kant's Nebular hypothesis

1755 In 1754, **Kant** said that the Earth was hundreds of millions of years old.)

In 1755, **Kant** suggested that *nebulae /clouds*, (bright but not distinct spots in the heavens) were not stars in our Milky Way galaxy but "island universes" far beyond the clearly visible and distinct stars in our *Milky Way*. (**Hubble** confirmed this in the 1920s, 170 years later.)

Kant sought to describe the phenomena of nature, both organic and inorganic, as a whole of interconnected natural laws.

Monadologia physica

Said, "Two things fill the mind with ever increasing awe, the starry heavens above and the moral law within me." The heavens, as per **Newton**, were governed by specific natural laws, while the moral law within was a product of human freedom of thought. **Kant** published *Monadologia physica*, which said that **Newton's** mechanistic analyses were better than **Leibniz's** more abstract methods.

Kant sought a theory unifying the universe and the working of the mind. (more **Kant** 1781, '85, '88, '90)

Conservation of mass

1756 **Conservation of mass**: (ref. 1714-**Leibniz**) The idea that nothing comes from nothing is ancient. Greeks **Empedocles** and **Epicurus** had expressed it. (**Nasr al-Dīn al-Tūsī** in the 1200s had stated a principle of the conservation of matter.) By the 1700s the principle of conservation of mass was widely used in chemical experiments by chemists **Joseph Black**, **Henry Cavendish**, and **Jean Rey** even before a definition was formally established.

- Burke:** Political Theory: Edmund Burke (1729-97) (ref. 1532), Irish-English Anglican, conservative, in *Vindication of Natural Society*, "All governments must frequently infringe the rules of justice to support themselves, that truth must give way to dissimulation, to convenience." Also, "The division of society is rich and poor."
Governments have to lie. The poor are to serve the rich. "The whole business of the poor is to administer to the idleness, folly, and luxury of the rich. . . In a state of nature, a man's goods depend on his labors. In an artificial society, it is an invariable law that those who labor most have the fewest things. Those who labor not at all have the greatest number of enjoyments."
 It is hard to say whether the doctors of law or divinity have made the greater advances in the lucrative business of mystery. The greater the power, the more dangerous the abuse." (More **Burke** 1775, '90, '93)
- 1756 **Franklin honored.** Franklin was elected to the Royal Society for his experiments with electricity. In 1757, Pennsylvania sent him to London to represent its interests. In 1759, the University of St. Andrews awarded him an honorary doctorate as did Oxford in 1762. He traveling around England. He visited Joseph Priestley, Erasmus Darwin, Law Lord Kames, and three weeks with Hume and Adam Smith in Edinburgh.
- 1757 **Scurvy** Medicine: Scurvy killed more sailors than war did. **James Lind**, Scot, British naval surgeon, advised to give sailors citrus to prevent scurvy. The Navy studied it for 40 years, gave its sailors citrus. Scurvy disappeared.
- 1758 **De l'esprit. On the Mind. Education can make people stupid** The Enlightenment: Claude Helvetius (1715-71), French, wealthy, vehemently anti-clerical, published his philosophical magnum opus, *De l'esprit / On the Mind*, which claimed that all human faculties are attributes of mere physical sensation, and that the only real motive is self-interest, therefore there is no good and evil, only competitive pleasures. He advocated a complete overhaul of France's educational system, separate it from Church control. He said the differences between individuals was due entirely to differences in education. He accepted Locke's *tabula rasa*. Humans are born ignorant, not stupid; education can make them stupid. His atheistic, utilitarian and egalitarian doctrines were hated by the rich.
- Voltaire Quotes.** Voltaire moved to Ferney, a French suburb of Geneva, where he lived until he died in 1778.
 In his lifetime, **Voltaire** wrote constantly. Here are a minute few of his ideas: "He who is only wise lives a sad life." "Judge a man by his questions rather than by his answers." "It is better to risk sparing a guilty person than to condemn an innocent one." (In 1747, **Blackstone** repeated this.)
 "It is dangerous to be right in matters on which the established authorities are wrong."
 "One who persecutes a man, his brother, because he is not of the same opinion, is a monster."
 "The best is the enemy of the good." "Atheism is the vice of a few intelligent people." "A witty saying proves nothing." "So long as people do not care to exercise their freedom, those tyrannize will do so." "It is forbidden to kill, so murderers are punished, unless they kill in large numbers and to the sound of trumpets. "Doubt is not a pleasant mental state, but certainty is an absurd one."
- Christianity is attributed to Jesus, invented by Plato, improved by Paul, & revised by the Church fathers** "For 1,700 years the Christian sect has done only harm. Christians have been the most intolerant of all men.
Christianity is the most ridiculous, the most absurd and bloody religion that has ever infected the world.
 In religion, [heresy] does not mean actions hurtful to society, but actions hurtful to the clergy."
 Christianity is "a religious system attributed to **Jesus**, but really invented by **Plato**, improved by **Paul**, and finally revised and corrected by the Church fathers. The *Devil* is "the black sheep of the heavenly hosts."
- Christianity is the most absurd religion.**
- Voltaire Quotes** "But all nature cries aloud that [God] does exist: that there is a supreme intelligence, an immense power, an admirable order, and everything teaches us our own dependence on it.
 If God did not exist, He would have to be invented. Prejudices are what fools use for reason.
 I have never made but one prayer to God, a short one. Make my enemies ridiculous. And he granted it."
- 1759 **Comets: Halley is vindicated** Astronomy: Edmund Halley had been named Astronomer Royal in 1721 and died in 1742. In 1759, the comet he had predicted in 1696 came as he predicted. The comet was then named **Halley's** comet
 This debunked religious beliefs that comets foretold events and strengthened respect for science..
 The Vatican announced that reading **Copernicus's** 1543 *Revolutions* was not heretical. (216 years late) Catholics were thus allowed to read **Copernicus** but not **Galileo's** 1632 *Dialogue* until 1835.
- 1761 **Holbach: Christianity Unveiled** French Enlightenment: Paul-Henri Thiry / Baron d'Holbach (1723-guillotined 1789), German-French philosophe, wrote 400 mostly scientific articles for Diderot's *Encyclopedie*. He published (all anonymously) numerous atheistic attacks on Christianity as an impediment to the moral advance of humanity, starting with *Christianisme devoile / Christianity Unveiled*, in 1761.
 He lived in Paris. He hosted a salon for *philosophes*, called it a "synagogue of atheists."
 His writings and salon was the most responsible force that transformed atheism from scattered isolated thinkers into an openly avowed social network that created a tradition of anti-clerical thought. He said, "There is no crime which men haven't committed
- He made atheism a movement**

under the idea of pleasing the Divinity, or appeasing his wrath.” When **Hume** visited **d’Holbach’s** salon, the assemblage had no word for agnosticism. **T H Huxley** coined the word 1869.

1761 **James Otis** Political Theory, *Enlightenment* ideas in America: **James Otis Jr.**, Boston lawyer, argued against the “writs of assistance” that allowed British troops to enter colonials’ houses at will. Later, arguing against the *Stamp Act* (1765), he declared, “Taxation without representation is tyranny.” “God made all men naturally equal . . . Kings were made for the good of the people, not the people for them. No government has the right to make slaves of its subjects.”

1761 **An accurate marine clock** *Longitude*: **John Harrison** (1693-1776), Brit, a skilled clockmaker, after 31 years of effort, invented a very accurate clock that worked on ships. He devised a “compensation curve” that altered the length of the balance spring in proportion to the expansion or contraction caused by temperature changes. So it could calculate longitude using Fris’s 1533 method. 12 years later, in 1773, and only after the king intervened, Parliament *partially* paid **Harrison** the £20,000 the *Board of Longitude* had promised.

Julie: **Rousseau** (ref. 1754, ‘58) published an 800-page novel of sentiment, *Julie, ou la nouvelle Héloïse*. It was the century’s best seller. The book’s rhapsodic descriptions of the natural beauty of the Swiss countryside appealed to many and may have helped spark the subsequent 19th century craze for Alpine. It also reflected the increased societal empathy for the rights and needs of common people, a sea in Western upper classes’s attitudes. But **Rousseau** considered men to be superior to women. “The whole for women should be to please men, to be useful to them, to win their love, to tend them, to console them, and to make their life and pleasant; these are women’s duties.”

1762 **Rousseau:** Political Theory, *monarchy*: France was ripe for revolt. A despotic king with a decadent court ruled by divine right. The corrupt Church owned 20% of the land, and was barely taxed. Nobles were lightly taxed. Peasants did the fighting, paid the taxes, and died in stupid wars. In response, **Rousseau** wrote *Du Contrat Social, ou, Principes du Droit Politique/ The Social Contract, or Principles of Political Right.* It was printed not in France but in Amsterdam. It was revolutionary in that it advanced a democratic theory of government. It glorified the common Man, the noble savage, identified government as a social contract between men and their government. He said, No social right comes from nature. All social rights come from an agreement among men. The sovereign is limited to the making of general laws. He advocated “feeling,” not reason. **Rousseau** wanted people (men only, that is) to be free and equal, but in doing so, to surrender their natural liberty to one another, fusing their individual wills into a *general will*. He favored a compulsory civil religion.

The Social Contract: “Man is born free, and everywhere he is in chains. Natural rights His book preached the sovereignty of the people and the sacredness of the general will. “Man is by nature good. Man is depraved and perverted by society.” Determining the *general will* was of course difficult, and there was no protection for those who disagreed with it. He said that the ideal government is a small elected group. They are public servants. If they become arbitrary and defy the general will, the people can rebel to restore their rights. (**Locke**-1688). He rejected a monarchy as a king keeps the people in a wretched state so they can’t rebel. He preferred an elected aristocracy of experience and wisdom. **Rousseau** stressed a link between liberty and equality.

Laws are useful to property owners **Rousseau** But also, “Laws are always useful to persons who own property and injurious to those who do not. Laws give the weak new burdens and the strong new powers.” They irretrievably destroyed natural freedom, established in perpetuity the law of property and inequality, turned a clever usurpation into an irrevocable right, and brought the whole future race under the yoke of labor, slavery, and money.” . . . “Whoever refuses to obey the general will shall be forced to do so by the Whole body, which means nothing other than he shall be forced to be free.”

Rights are man-made: The “right” of conquest is only who is stronger. The “right” of slavery is absurd. “The strongest is never strong enough always to be master, unless he transforms strength into right, and obedience into duty. The words *slave* and *right* contradict each other. Tranquility is found also in dungeons; but is that enough to make them desirable places to live in? The right of conquest has no foundation other than the right of the strongest. The “right” of slavery is null and void, not only as being illegitimate, but also because it is absurd and meaningless. If war does not give the conqueror the right to massacre the conquered peoples, the right to enslave them cannot be based upon a right which does not exist. Every man has naturally a right to everything he

needs. Having his share, he ought to keep to it, and can have no further right against the community."

Rousseau Quotes Punishments: "We may add that frequent punishments are always a sign of weakness or remissness on the part of the government . . . In a well-governed state, there are few punishments, not because here are many pardons, but because criminals are rare; it is when a state is in decay that the multitudes of crimes is a guarantee of impunity.

The Social Contract Government: "It is the best and most natural arrangement that the wisest should govern the many, when it is assured that they will govern for its profit, and not for their own. . . The more concert reigns in the assemblies, that is, the nearer opinion approaches unanimity the greater is the dominance of the general will. Generally, democratic government suits small aristocratic government, those of middle size and monarchy great ones. . .

Separation of powers It is not good for him who makes the laws to execute them. . . Nothing is more dangerous than the influence of private interests in public affairs, and the abuse of the laws by the government is a less evil than the corruption of the legislator. . . Peace, unity and equality are the enemies of political subtleties."

"Men who are upright and simple are difficult to deceive because of their simplicity; lures and ingenious pretexts fail to impose upon them, and they are not even subtle enough to be dupes.."

Rousseau Quotes England: "The English people believe themselves to be free; They are gravely mistaken; they are free only during election of members of parliament; as soon as the members are elected, the people are enslaved; "As soon as any man says of the affairs of the State, What does it matter to me?," the State may be given up for lost. . . Good laws lead to the making of better ones; bad ones bring about worse." (As many as a quarter of a million English and Irish men were forcibly sent abroad as sailors in the British Navy. Women and men without property, slaves, indentured servants, and tenant farmers, couldn't vote. So around 5-8% of the American colonists could vote. In England about 4% could vote)

Rousseau Quotes "Christianity preaches only servitude and dependence. Its spirit is so favorable to tyranny that it always profits by such a régime. The dogmas of civil religion ought to be few, simple, and exactly worded, without explanation or commentary. Tolerance should be given to all religions that tolerate others, so long as their dogmas contain nothing contrary to the duties of citizenship. "

1762 **Rousseau's** conception of equality suggested that nations are founded on the dignity of the common people rather than on hierarchies. . . .He said that thinking about the existence of God just leads one to contradictions, but one's heart's impulses are of more value and these lead to the truths of natural religion, namely the existence of God and the immortality of the soul. His ideas paved the way for the *Romanticism* which succeeded *the Enlightenment* in the early 19th century.

All The Enlightenment thinkers criticized organized Christianity The Enlightenment: Almost any 18th century Western thinker was critical of organized Christianity, Catholic or Protestant. Anti-clerical, anti-monarchy social critics, philosophes, like Diderot, Montesquieu, Voltaire, and Bayle, but most importantly, Baron d'Holbach also questioned all authority, principally **Aristotle** and the *Bible*, and favored a purely rational ideology.

They carried out a moral crusade against intolerance, tyranny, and superstition. **Holbach** said, "All religions are ancient monuments to superstition, ignorance, ferocity. Modern ones are only ancient follies rejuvenated." *Philosophes* wanted to change the world through science. They believe foremost in the power of reason and in knowledge against the prevailing religious and political dogmas.

1762 **Childhood** Education: **Rousseau's** *Emile* was the story of a child reared apart from other children and subject to experimental methods. It was as influential as his *Social Contract*. It helped create the concept of *childhood* as a sanctuary before the hardships of life. Previously children were treated as small adults.

1763 **Kant's argument for God** Theology: **Kant** argued that the internal possibility of all things presupposes some existence: Accordingly, there must be something whose nonexistence would cancel all internal possibility whatsoever. This is a necessary thing. **Kant** then argued that this necessary thing must have all the characteristics commonly ascribed to God. Therefore God necessarily exists.

1763 **Voltaire** Protestant intolerance: **Voltaire** began to champion persons unjustly persecuted. A Huguenot was tried for killing his son who converted to Catholicism. He was tortured to death, his possessions taken. **Voltaire** criticized the bigotry of the trial: Said, "The people of Languedoc have enough religion to hate and persecute, but not enough to love and succor." **Voltaire** got his conviction overturned in 1765.

- 1763 **America** French and Indian War: Britain fought the French in North America, obtaining Canada. During the war, the British commander, Lord **Jeffery Amherst**, ordered blankets from a smallpox hospital be given to the Indians, purportedly as a kind gesture. It killed many Indians. After the war, England left thousands of troops in America, and, to appease rebellious Indian tribes, prohibited settlers from settling further west than the Appalachian mountains, land that settlers wanted. Resentment of King **George 3** grew.
- 1764 **England** Law: Penal practices in Europe in the 18th century were, in a word, horrible. Death was the only punishment for a felony conviction. 160 different acts were felonies. Peasants couldn't own guns. The deer parks were closed to peasants. Thieves could be whipped, burned, or hanged for stealing shirts, coats, or pewter spoons. Torture was normal. Two of the worst abuses were torture & the nobles' use of secret informers.
- Penal colonies** Political Theory, deporting "troublemakers": In England, one needed the permission of the local Justice of the Peace ("JP"), normally the lord of the manor, to move from one's town. JPs often sent persons to a penal colony for trivial offenses. England sent an estimated 300,000 persons, roughly 4% of its population, to penal colonies in America, and, starting in 1788, to Australia, New Zealand, and other colonies. Most white immigrants to America were indentured servants.
- 1764 The rise of factories in cities with child labor dehumanized workers. The average life span in Europe was around 37. The penal system was cruel. Many laws were unjust, like religious crimes, victimless crimes.
- Criminal justice reforms** Law: Cesare Bonesana, Marchese di Beccaria (1738-94) Milan, eminent jurist and criminologist described this situation, anonymously, in *Dei Delitti e delle Pene / Crimes and Punishments*, He proposed reforms; said all law and power must justify itself by showing that it secured the greatest happiness at the least cost to individual liberty. Punishments ought to deter, not brutalize; so ban the death penalty, all accusations and trials be public, with trial by a man's peers. Have no penalties beyond the minimum needed to deter. Laws ought to be just severe enough to offset any benefit from the crime. Theological conservatives attacked the book fiercely, said it ignored retribution. But it prompted many reforms throughout Europe. His book would also form the basis of what's called rational choice theory. That is, people act in their best interest. His ideas helped establish modern economic theory.
- Dictionnaire Philo-sophique** Voltaire's Dictionnaire philosophique portatif / Philosophical Dictionary was first printed anonymously with 73 essays. During his life, he added articles often with a new title eventually filling 9 volumes on the arts, science, personal matters, religions (particularly Catholic), architecture, adultery. He was vitriolic against Jews. His *Dictionary* said that the *Hebrew Bible* totaled c239,000 Jews killed by other Jews at God's order.
- 1765 Law: Not only was the penal system in Europe rotten, the whole of civil law was control by the rich. One English critic had described English law as "a disordered agglomeration of tradition, statutes, local customs, feudal vestiges, judicial interpretation of miscellaneous principles."
- Blackstone Commentaries on the Laws of England: 17 chapters on Rights of persons, One chapter on Rights of corporations** Law: William Blackstone (1723-80), prominent British judge, literary critic, poet, architect, legislator, printer, businessman, first professor of law at Oxford, published *Commentaries on the Laws of England*, based on his lectures. It was the first methodical treatise on the law. English common law relied on precedent far more than on statutes. Translations were made in France, Italy, Germany, Russia, and China. It brought order to the chaos. Its four volumes covered all aspects of English common law. It described the Rights of Persons, the Rights of Things, Private Wrongs, and Public Wrongs. He distinguished between absolute rights (natural rights that existed before the state) and social rights derived from the state. *Rights of Persons* had 17 chapters, and corporations one chapter. It made English law into a rational whole.
- In England, private property was valued over the common good.** He also supported law reform, criticized the penal system and the frequency of capital punishment. He said the death sentence was imposed for a dreadful list of different kinds of offenses. *Commentaries* became the basic legal text in England and in America through the 19th century, linking the legal principles of the US and England. Like **Hobbes** (ref 1651), he said that the sovereign must have "supreme, irresistible, absolute, uncontrolled authority." **Blackstone** represented conservative English legal thought. He said, "So great is the regard of the law for private property, that it will not authorize the least violation of it; no, not even for the common good of the whole community." His *Commentaries* were used in all English speaking countries. In 1753, he had denounced slavery as repugnant to reason and natural law. (more **Blackstone** 1777)

Steam engine; Industrial Revolution

Physics: James Watt (1736-1819) Scot, improved **Newcomen's** 1712 steam engine. **Watt** and ironmaster **Matthew Boulton** transformed Britain's economic life with their improved steam engine, which made the Industrial Revolution possible. They laid the foundation of modern mechanical engineering, which made the modern factory system possible. The concept of mechanical power became public knowledge.

1765 Industrial revolution

Watt's engine was still just 5% efficient. That is, the output of work was just 5% of the input of heat (but coal and labor were cheap). He and Boulton had a monopoly of steam engine construction for 25 years. They became rich. (See 1824-**Sadi Carnot**)

Unrest in America

Colonialism, unrest in America: Each colony supported its own religious sect; most were Protestant. All colonies had laws *against* Quakers, except Pennsylvania. Quakers had no organized clergy. Quakers were the driving force against slavery in America. Pennsylvania became the most prosperous colony, Philadelphia the largest colonial city. **Benjamin Franklin** lived there. He founded civic organizations, Philadelphia's first fire department, and later the Library Company.

Illegal to teach Blacks to read or write

Whites feared educated Blacks: The principal cause of unrest in the colonies was the inequality in wealth / power. Slave owners, a small minority, were wealthy. They controlled the colonial legislatures, the militias, and the taxing power. Between 1740 and 1834, Alabama, Georgia, Louisiana, Mississippi, North and South Carolina, and Virginia passed laws prohibiting teaching slaves to read and write.

1765 Slaves, Black or White, were property in the Northern colonies as well as the South.

In Virginia, killing non-Christians was legal. Virginia regulated religions so that only Anglicism could qualify. Women and white indentured servants had few rights, Blacks none.

Noah Hawley, contemporary American writer, "It's worth noting who had rights and who didn't in frontier times. We can do it quickly, because the list is short. White men had rights. That is all."

The colonies' economies differed.

Trade: The colonies differed in religion, acceptance of slavery, economic systems, patterns of land ownership, but had in common the threat from the French and Indians (whose lands they were taking), and mostly the oppressive trade restrictions of the British.

Parliament ignored it.

Franklin said that British mercantilism was unsustainable. It alarmed British leaders who did not want to be surpassed by the colonies, so they imposed more restrictions on colonial economy.

Dutch ships carried the most trade goods worldwide, but all British colonies' world trade had to be bought or sold through British ports and British agents.

British imperial supremacy was based on its sea power. British soldiers lived among the colonists.

England imposed a *Stamp Act* to help pay for the 1763 French and Indian war. In New York, the colonial "Stamp Act Congress" wrote a *Declaration of Rights*, protesting the *Tyrannical Acts of the British Parliament*. Parliament and the obtuse **George 3** ignored it. However, **William Pitt** the Elder (1706-78) twice PM, in Parliament said, "I rejoice that America has resisted."

1766 Modern chemistry: Henry Cavendish (1731-1810), Brit, produced a gas from acid put on certain metals. He exploded this gas mixed with atmospheric air with an electric spark. It created water. So he called the gas *inflammable air*; (it's hydrogen). He was familiar with the principle of *conservation of mass* during chemical reactions. It was widely used and was assumed correct during experiments, even before it was formally called a law. (More 1783, '88, '98)

1766 Biology: Albrecht von Haller (1708-77) Swiss, showed that nerves which led to the brain controlled muscular movement,

Philosophy of History

1766 Philosophy: Voltaire wrote *The Philosophy of History* to ridicule nonsensical beliefs of religions, from the Chaldeans to Jews to Christianity. It said that Jews killed by other Jews or at God's order in the *Old Testament* was over 239,000. The book was as popular as **Erasmus's Praise of Folly**.

Voltaire termed **Jesus** a "good fellow," but not divine. **Voltaire** lived his last 20 years in Ferney, a suburb of Geneva in France. After his death, it was named Ferney-Voltaire.

1767 Philosophy: Adam Ferguson (1723-1816), professor at Edinburgh, wrote *Essay on the History of Civil Society*, historian of, important figure of, and popularized, the *Scottish Enlightenment*. He did early work in the science of sociology. He said that commercial society made men weak, said the struggle between civil and military authorities was the central dilemma of modern constitutional government.

1768 Political Theory, utilitarianism: Joseph B Priestley (1733-1804), Arian /Unitarian minister, chemist, member of the *Royal Society*, friend of **Ben Franklin**. His *Essay on the First*

Principles of Government paraphrased **Hutcheson's** 1726 idea (See 1726) as "the greatest happiness for the greatest number" As the test for moral action.

Jeremy Bentham made **Priestley's** phrase the basis for his philosophy of utilitarianism. (See 1780-Bentham.) **Priestley** tried to fuse Christianity with reason. He failed.

Priestley Quotes:
Relief from oppression is a natural right.

Priestley said, "Every man retains, and can never be deprived of, his natural right (founded on a regard to the general good) of relieving himself from all oppression, that is, from everything that has been imposed on him without his own consent. "This must be the true and only foundation of all governments subsisting in this world, and that to which the people who compose them have an unalienable right to bring them back." (1771) (more **Priestley** 1770, '74, '78, '80, p. 423)

1768-78 *Sturm und Drang* / Storm and Stress was a early romantic movement in middle-class German literature and music in reaction to the perceived constraints of the materialism of the *Enlightenment*. It was characterized by individual subjectivity and extremes of emotion. **Johann Goethe** (1808) was a leader.

1769
History proceeds in a mist

History: **Adam Ferguson**, chairman of natural philosophy at Edinburgh, in *Essay on the History of Civil Society*, said. "Progress is not linear or inevitable; history proceeds in a mist. Modern society (division of labor) makes men weak and soft, lose their sense of honor and courage." He influenced **Johann von Herder** and **Hegel**, a founder of modern German "cultural nationalism." (See 1772)

1768-71
Joseph Banks and Captain Cook

Botany, astronomy, navigation: Sir **Joseph Banks** sailed three years around the Pacific on Captain **James Cook's** first voyage around the world. He collected c.30,000 plants, c.1,400 not seen before, upping by 25% the number of known plants. The *Royal Society* paid **Cook** a bonus over his naval salary to chart the *transit of Venus* while his ship was in Tahiti (a *transit* is when a planet passes between the Sun and the Earth). This let astronomers fix the size of the solar system by parallax and **Kepler's Third law**. (more **Cook**, 1772).

Plant and animal collecting became an international mania. As more and more species were found, the story of Noah became an impossible problem for those who believed the *Bible* was the literal truth. **Linnaeus** said that were 4,000 species of animals. The number of species was increasing rapidly.

Noah's Ark got bigger

The ark 300 cubits long, 50 wide, and 30 high (440 ft, 72, and 43) How did they fit on the ark? How did the animals get to Mt. Ararat from the Americas, Australia, and remote islands and back to lands that Paul said didn't exist. How were the ferocious animals handled? How did Adam name them all? Origen had suggested the cubit was six times larger than supposed. (A half-mile long ark?). Monk Bede (731) said Noah worked on it 100 years. In short, there were no plausible theology answers.

As astronomers destroyed the Church's geocentrism, now biologists were destroying the *Bible*.

1770
Wealth was unequal in America

America: **Kenneth Lockridge**, historian, "The wandering poor were a distinct part of New England." British soldiers stationed in Boston killed five colonists. **John Adams** defended them at their trial. In Boston, the richest 1% owned 44% of the wealth, mostly property. 29% of adult males owned no property. An additional 21% were slaves. From 1630-1776, most white immigrants were indentured servants. Northern ships sailed in the African slave trade. In the 1600s and 1700s there were hundreds of strikes, rebellions, riots, by slaves, and Blacks and Whites, acting together.

Heat transfer
Pioneering chemist

Chemistry: **Carl Wilhelm Scheele** (1742-86), a Swedish pharmaceutical chemist, became director of the laboratory of the great pharmacy at Uppsala. He made a number of chemical discoveries before others who are generally given the credit. He discovered oxygen, (although **Joseph Priestley** published his findings first), and identified molybdenum, tungsten, barium, and hydrogen, and chlorine before **Humphry Davy**. **Scheele** also discovered organic acids tartaric, oxalic, uric, lactic, citric, and hydrofluoric, hydrocyanic, and arsenic acids. He distinguished heat transfer by thermal radiation from that by conduction and convection.

Systeme de la nature

Philosophy, atheism: Baron **d'Holbach** (ref. 1761) published, anonymously, his most famous, *Le Systeme de la nature*. It denied the existence of a deity. It said that the universe was nothing but matter in motion bound by inexorable natural laws of cause and effect.

He said, "Ignorance of natural causes created the gods and priestly impostures made them terrible." The Vatican commissioned a refutation of *Systeme*, threatened King **Louis 15** to end financial support unless he suppressed its circulation. It was condemned and ordered to be burned.

Holbach "All religious notions are uniformly founded on authority; all religions . . . forbid examination,

and are not disposed that men should reason upon them.” His book described the *Scriptures* asserting that God lays snares for men, inviting them to sin, which God could prevent, and then punishes them horribly. He called Christianity a morally dangerous muddle, created by self-interested priests supported by political tyrants to oppress the masses.

Man, a tiny speck in the cosmos, thinks it's made just for him.	Holbach ridiculed man's belief of his own importance. “Suns are extinguished or become corrupted, planets perish and scatter across the wastes of the sky; other suns are kindled, new planets formed to make their revolutions or describe new orbits, and man, an infinitely minute part of a globe which itself is only an imperceptible point in the immense whole, believes that the universe is made for himself. We are all just cogs in a machine, doing what we were always meant to do, with no actual volition.”
Holbach Quotes 1770	“It is thus that for opinions, which no man can demonstrate, we see the Brahman despised; the Muslim hated; the Pagan held in contempt; that they oppress and disdain each with the most rancorous animosity. The Christian burns the Jew . . . because he clings to the faith of his fathers.”
Christian vs. Christian	Holbach: “The Roman Catholic condemns the Protestant to the flames, and makes a conscience of massacring him in cold blood; this reacts in turn; sometimes the various sects of Christians join together against the incredulous Turk, and for a moment suspend their own bloody disputes that they may chastise the enemies to the true faith. Then, having glutted their revenge, return with redoubled fury, to wreak over again their infuriated vengeance of each other.”
Holbach Quotes	“All children are born atheists; they have no idea of God. Religion has ever filled the mind of man with darkness, and kept him in ignorance of his real duties and true interests. It is only by dispelling the clouds and phantoms of religion, that we shall discover Truth, Reason, and Morality.”
Holbach Quotes System de la nature	“Religion diverts us from the causes of evils, and from the remedies which nature prescribes; far from curing, it only aggravates, multiplies, and perpetuates them. Everything that passes in the world proves to us, in the clearest manner, that it is not governed by an intelligent being. To wonder at the order of nature, is to wonder that any thing can exist; it is to be surprised at one's own existence.” “The worshipers of God find, above all in the order of the universe, an invincible proof of this existence of an intelligent and wise being, who governs it. But this order is nothing but a series of movements necessarily produced by causes or circumstances, which are sometimes favorable, and sometimes hurtful to us; we approve of some, and complain of others.”
Systeme de la nature	“A Protestant is bound to believe the gospel to be divine: and the examination of it is permitted only while he finds there what the ministers of his sect have resolved that he shall find. Beyond this, he is regarded as an ungodly man, and often punished for the weakness of his intellect.”
Jews had no afterlife Jews learned an afterlife from Zoroaster	Holbach commented on when Jews' first mentioned the concept of Hell and the resurrection, “We are quite surprised to learn that <u>Moses</u> and the ancient Hebrew writers nowhere mentioned the <u>dogma of a future afterlife</u> which now forms one of the most important articles of the Christian religion. It was after the Babylonian captivity [c 600 BC] that the Jews learned of the dogma of another life, and the resurrection, when they learned of the Persian disciples of Zoroaster . In the time of Jesus , that [an afterlife] was not even generally received.
Why doesn't God show himself?	Holbach critiqued the ambiguities and vagueries in the <i>Bible</i> , “ <u>It cannot be conceived why a God, sent to instruct men, should never distinctly explain himself.</u> No Pagan oracle employed terms more ambiguous, than the divine missionary chosen by Providence to enlighten nations. In Christianity is real Manichaeism, wherein every advantage is on the side of the bad principle, who, by the great number of his adherents renders nugatory all the purposes of the Deity.”
Jesus could have shown he was resurrected	Holbach: “The dogma of the <u>resurrection of Jesus</u> is only attested to by men whose living depended on that <u>absurd romance</u> ; and as roguery continually belies itself. These witnesses could not agree among themselves in their evidence. . . Was it reasonable to require the Jews to believe, on the word of his disciples, a fact which [Jesus] could have demonstrated before their own eyes?”
The first Christians	Holbach: “How is it possible for rational persons today to believe, after eighteen hundred years, on the differing testimonies of four interested evangelists, fanatics, or fabulists, a story which they could not believe in their own time; except by a small number of credulous people, incapable of reasoning, fond of the marvelous, and of <u>too limited understandings</u> to escape the snares laid for their simplicity?”

"Faith and reason contradict each other. Either faith is a chimera or reason is useless."

Systeme de la Nature **Holbach**: "The ancient belief that before **Adam's** fall, people believed that serpents, stood erect, walked and talked until Christian professor of divinity at Cambridge, **Richard Watson**, debunked it."

1771 Power corrupts Political Theory, power corrupts: **William Pitt**, MP, said, "Unlimited power is apt to corrupt the minds of those who possess it. . . The greater the powers, the more dangerous the abuse." (Same **Montesquieu** 1748, **Burke** in 1756, and Lord **Acton** in 1887. See more "power corrupts" quotes in the Index, p. 480).

1772 Political Theory, democracy: **Samuel Adams** (1722-1803), revolutionary, brewer, philosopher, "Among the natural rights of the colonists are these: first, a right to live; secondly, to liberty; thirdly, to property [slaves]; together with the right to support and defend them in the best manner that they can."

c.1772 **Herder, Goethe, Schiller, humanists** Political Theory, Weimar classicism: **Johann Gottfried von Herder** (1744-1803), **Goethe** (1808), and **Christof Friedrich von Schiller** (1759-1805) sought to establish a new *humanism* by synthesizing Romantic, classical, and *Enlightenment* ideas. **Herder** established fundamental ideas on an intimate dependence of thought on language that underpin modern philosophy of language.

German identity He argued that *volk* had their own special identity expressed in its own language and culture. Human creativity, unpredictable and diverse, was as important as human rationality. **Herder** was considered the prophet of *Romanticism*. He praised the moral power of "true poetry" of those called savages. The ideas of the *Enlightenment* were consistent with the idea of *Europe* as a culture /civilization apart from Christendom. (See 1776-**Gibbon**)

1772-75 Geography: Captain **Cook** (ref. 1768) used a copy of a **Harrison** clock (1761) for *longitude* on his 2nd and 3rd voyages around the world. Watchmakers were the ultimate craftsmen of the day. *Latitude* was found with an astrolabe. **Cook** mapped much of the Pacific. To prevent scurvy, he fed sauerkraut to his crew. The British Navy used citrus 25 years later.

Smallpox Medicine: It was long known that persons did not get smallpox twice. **John Hunter**, Scot, turned surgery from a barber's part-time job into a scientific discipline of anatomy. He taught Dr. **Edward Jenner**. In the ensuing 20 years at least six doctors in England and Germany had experimented with using cowpox, a mild cousin of smallpox to inoculate against smallpox. (See 1796)

1773 Tea Party *Unrest in America*:. To protest the *Tea Act of 1773*, 150 *Sons of Liberty* dressed as Mohawk Indians tossed an entire shipment of East India Company tea into Boston harbor, the *Tea Party*. (East India's private navy was larger than the British navy.) Parliament responded in 1774 with the *Intolerable Acts*, which ended self-government in Massachusetts and closed Boston harbor.

1774 Continental Congress These coercive acts were a major reason the colonies convened the *Continental Congress*. It met Sept.-Oct. 1774 with delegates from 12 colonies, including **George Washington** (1732-'99), **John Adams**, **Samuel Adams**, **Patrick Henry**, and **John Dickinson**. The *Congress* petitioned King **George 3** for redress of their grievances. They did not seek independence but formed a Patriot provisional government known as the Mass. Provincial Congress and called for local militias to train for possible hostilities. Colonists controlled Massachusetts except for British-controlled Boston.

A Summary View of the Rights of British America

Thomas Jefferson (1743-1826), a wealthy educated Virginia slave owner, wrote *A Summary View of the Rights of British America* as proposed instructions for the Virginia delegates to the Continental Congress. The delegates rejected it as extreme, but friends of **Jefferson** had it published. It received immediate wide praise. It was reprinted in Philadelphia and London.

Jefferson said that British Americans had the right to establish their own laws as the Saxon forefathers had done in England. It was written as a petition against "many unwarranted encroachments and usurpations, attempted to be made by the legislature of one part of the empire upon those rights which God and the laws of Nature have given equally and independently to all."

He also denounced the king for vetoing laws that abolished domestic slavery.

The Brits and colonial militias prepared for war Parliament and **George 3** did not respond. The *Congress* called for a boycott of British goods. Trade plummeted. The colonies' richest men, *Enlightenment* men, knew their rights from **Locke**. The Brits and colonial militias prepared for war. **Ben Franklin**, then in England representing Pennsylvania, sponsored **Thomas Paine** (1737-1809) to go to America. **Paine** came to Philadelphia. He went to work as a journalist for the *Pennsylvania Magazine*. (More **Paine** 1775-77, '89, '92-93)

1774 *Slavery, colonists' hypocrisy*: **Abigail Adams** (1744-1810), wife of **John Adams**, "It always

appeared a most iniquitous scheme to me-to fight ourselves for what we are daily robbing and plundering from those who have as good a right to freedom as we have.”

Astronomy: **Charles Messier**, French, published a list of 45 cloudy blobs of light in the heavens (as opposed to distinct stars), *Messier objects*. The full *Astronomy Timeline* is on pp. 432-437.

Classic conservative 1774 Political Theory, conservatism: **Burke** (ref. 1756), MP, advocated reconciling with the colonies. He criticized King **George 3**. He wrote, “a great empire and little minds go ill together . . . All government- indeed, every human benefit and enjoyment, every virtue and every prudent act is founded on compromise and barter.” “A perfect democracy is. . . the most shameless thing in the world.”

1774 Chemistry: **Priestley** (ref. 1768) isolated a gas from a brewery, saw how brightly it burned a candle; put a mouse in it; the mouse thrived. He breathed it himself. He breathed it easily.

In October, he visited Paris, and told **Lavoisier** (ref. 775) of the gas which he had produced by heating the red calx of mercury which burned very brightly. **Priestley** was unsure of the nature of this gas, but he felt that it was an especially pure form of common air.

Why a legislator may vote against his district's wishes 1774 Political Theory, Burke: *Speech to the Electors of Bristol*: In November, **Edmund Burke** explained to the voters of Bristol why MPs should use their judgment deciding matters of state, even when it differed from their district's local interests, “Government and legislation are matters of reason and judgment, and not of inclination; and what sort of reason is that, in which the determination precedes the discussion; in which (local voters debate, and distant MPs) decide. . . An MP ought always to most seriously. . . consider. . . But may arise from a fundamental mistake of the whole order and tenor of our constitution. Parliament is not a congress of. . . different and hostile interests; . . but is a deliberative assembly of one nation, with one interest, that of the whole; where, not local purposes, not local prejudices, ought to guide, but the general good, . . . You choose a member. . . but. . . he is not a member of Bristol, but he is a member of Parliament.” Tensions were rising between Britain and the colonies in America. **Burke** urged Parliament to be conciliatory to the restless colonies. (More **Burke** 1790-92)

1775 Unrest in America: March. Few colonists had independence in mind. They wanted redress for their grievances from the king. Speaking to the Virginia Convention, **Patrick Henry** said, “Is life so dear, or peace so sweet, as to be purchased at the chains and slavery. Forbid it, Almighty God! I know not what course others may take; but for me, give me liberty or give me death.” (**Henry** owned slaves, See 1775-Unrest-April)

1775 Modern Chemistry: **Antoine-Laurent de Lavoisier** French: (1743 –94), a French nobleman and chemist was central to the 18th-century chemical revolution. He was a man of the *Enlightenment*.

Lavoisier made the science of chemistry quantitative

He dedicated a significant portion of his fortune and work toward benefitting the public in several different areas, including agriculture, not just chemistry.

He created a sophisticated laboratory and supported aspiring scientists.

Despite **Boyle** (ref.1661-64) and centuries of underground experiments in alchemy, chemistry was only isolated experiments without a general theory. Beginning in 1773, with his brilliant, multi-talented wife, **Marie-Anne, Lavoisier** changed chemistry from qualitative to quantitative.

Determined the role of oxygen in combustion.

He started with a plan, read all he could about earlier experiments and began to systematically experiment. Contrary to prevailing thought, he theorized that air, or one of its components combines with substances when the substances burned. Precise weighing of all substances involved in chemical experiments was a key to his work.

Lavoisier discovered the law of the conservation of mass.

His most noted accomplishment was his memoir *On the Nature of the Principle Which Combines with Metals during Their Calcination and Increases Their Weight*, which he read to the Academy in April 1775 (the *Easter Memoir*). It clarified the concept of an element as a substance that could not be broken down by any known method of chemical analysis and presented his theory of the formation of chemical compounds from elements.

He reported to the Academy that when phosphorus burned, it combined with a large quantity of air and gained weight. It remains a classic in the history of science.

He soon told the Academy that he believed all substances add weight when burned

Lavoisier's studies of combustion were his most significant contribution to science..

His researches were some of the first truly *quantitative* chemical experiments. He carefully weighed the reactants and products of chemical reactions in a sealed glass vessel

so that no gases could escape, which was a crucial step in the advancement of chemistry.

Matter in chemical reactions, can be transformed

He showed that, although matter can change its state in a chemical reaction, the total mass of matter is the same at the end as at the beginning of every chemical change if the

into different matters but the elements involved are not destroyed. gaseous reactants and products are included. In other words, the law of conservation of mass. Once chemists realized that chemical substances never disappeared but were only transformed into other substances with the same weight, could they for the first time do quantitative studies of the transformations of substances. This period was a time of intense activity by several chemical experimenters, including **Joseph Black** (1728-99) and **James Watt** (1765)

Political journalist **Thomas Paine** (1737-1809) Brit, a deist, a journalist for, then editor of, the *Pennsylvania Magazine*, wrote an attack on American slavery. The article had substantially all the arguments against slavery.

The Shot Heard Round The World. Unrest in America-April 19: A British army unit marched from Boston to Concord to destroy a supply of rebel arms stored there. On the way, at Lexington, Mass, where **John Hancock** and **Samuel Adams** had encouraged the militia to resist the Brits. Eight of the local militia were killed. The Brits marched on to Concord and met there more local militia. "Here once the embattled farmers stood. And fired the shot heard round the world." **Ralph Waldo Emerson.** (It's uncertain which town was the actual locale.)

The delegates weren't thinking independence. England hired German soldiers

Minutemen killed 176 Brits on their march back to Boston while 49 local militia were killed.

In response to Lexington and Concord, on May 10, the Second Continental Congress met in Philadelphia with delegates from all 13 colonies. The Pennsylvania Assembly chose **Franklin** as their delegate. **John Hancock**, a wealthy Boston merchant, was president.

George Washington (1732-99), a wealthy Virginia slave owner was a delegate. (He owned the richest distillery in America.). Brits hired 39,000 German mercenaries for war in America.

Paine **Thomas Paine's** next magazine article was an attack on the practice of dueling, saying that it was barbarous, that it did not even tend to settle the right or wrong of a dispute.

Paine's third article, in May, was a protest against cruelty to animals.

Franklin returned to Philadelphia from London on May 5. He was named the colonies' first postmaster. He owned the *Pennsylvania Gazette*. He banned other papers from using the mails.

The delegates wanted not independence, just a redress of grievances

At the Congress, **Washington** said, "It is not the wish or interest of the Massachusetts government], or of any other upon this continent, separately or collectively, to set up for independence." "If you ever hear of me joining in any [separation from Britain] you have my leave to set me down for everything wicked." **Franklin** similarly assured a colleague that no one in America was in favor of separation. In fact, there was no organization urging independence. They wanted simply a redress of their grievances. Pennsylvania militia privates petitioned to elect all their officers. Turned down.

The war was on.

War: July 6, this *Second Continental Congress* issued a *Declaration on the Causes and Necessity of Taking Up Arms*. It chose **Washington**, a former senior military officer for the colonial governments to command the colonial militias. Several future revolutionaries were delegates.

The Congress's concluding words, written by **John Dickinson** (1732-1808), a wealthy slave owner, were: "Our cause is just. Our union is perfect. Our internal resources are great and if necessary, foreign assistance is undoubtedly attainable."

1775 **Paine:** August, **Paine** wrote a plea for women's rights in his magazine, the first such published in the New World. He said, "Religious duties consist in doing justice, loving mercy, making our fellow creatures happy.

Thomas Spence, Scot, advocated democracy, died poor

1775 Land reform, democracy: **Thomas Spence** (1750-1814), Scot, was one of the leading revolutionaries of his time. He was born in poverty and died the same way, after long periods in prison. He published a penny pamphlet *Property in Land, Every One's Right*. It advocated:

1. the end of aristocracy and landlords;
2. All land should be publicly owned by 'democratic self-governing parishes',
3. Rents of land in parishes to be shared equally amongst parishioners;
4. Everybody gets to vote, including women at both parish level and through a system of deputies elected by parishes to a national senate;
5. A 'social guarantee' extended to provide income for those unable to work;
6. The 'rights of infants' [children] to be free from abuse and poverty.

Spence spent his entire life working for these reforms.)

1776 Anthropology: **Johann Blumenbach**, German, influential, *His book, On the Natural Varieties of Mankind*, posited five divisions of Man (all in one species) Caucasians, Mongolian, Malayan, Ethiopian, and American .

1776 America: At the beginning of 1776, the colonies were in turmoil. The tiny upper class who

owned the most property were fearful of the masses of small tenant farmers who were rioting and of restless slaves. The merchants hated the British restrictions on their trade.

1776
Franklin
asked Paine
to write
*Common
Sense*.
First public
appeal for
independence. Most
powerful
pamphlet

Political Theory, independence: In December 1775, at **Ben Franklin's** urging, **Paine** wrote a 47 page pamphlet "*Common Sense, Addressed to the Inhabitants of America*." In January it was published, anonymously. It was the first public appeal for independence, for absolute separation, not just redressing grievances.

No pamphlet, no book, ever received such a sudden overwhelming positive reception.

In three months, over 120,000 copies were sold in a nation of around 2.8 million.

Plus, pirate copies were printed. Probably every literate person in the colonies read it. It was the most influential pamphlet ever. "O! Ye that love mankind. Ye that dare oppose not only the tyranny but the tyrant, stand forth. . . We have it in our power to begin the world over again."

He told how rebels could win. He said America's mission was to be the defense of freedom and democracy by presenting to the world the example of a republic of free men.

It was distributed to all the colonies and avidly read. It became the guiding spirit of the colonies.

First to write
the words:
"*The United
States of
America*"

Paine spoke of the United Colonies as glorious. He wrote of and about the free and independent States of America. He also spoke of the United Colonies as the "Glorious Union," and he was the first to write the words: "*The United States of America*." Soon the colonies told their delegates in the ongoing *Continental Congress* in Philadelphia to vote for independence.

Common Sense showed how a writing could change the course of history.

Colonies and towns began to issue declarations of independence. Colonial governors were routed. Some colonists wanted to stay with England. Some emigrated to Canada or the Caribbean.

By February, the colonists had been fighting for ten months. **Washington** and his troops were stalled. **Alexander Hamilton**, (1757-1804), a native of Nevis in the Caribbean, then an aide to **Washington**, wrote, "our countrymen have all the folly of the ass and. . . all the passiveness of sheep. . . they are determined not to be free. If we are saved, France and Spain must save us."

The second
powerful
document
of 1776,
*The Wealth
of Nations*

March, The second powerful document of 1776: In England, education was for the rich, penal laws were severe, wages were meager and fixed, no political rights for the masses. England had a cottage based manufacturing industry. **Adam Smith** (1723-90), Scot, Chairman of moral philosophy at Glasgow, deist, student of **Hutcheson** (ref. 1725), published *An Inquiry into the Nature and Causes of the Wealth of Nations*, It upended economics. It described how specialization of labor in a factory increased productivity immensely. His most graphic example was a pin factory, which, with specialization of labor, made many multiples of pins more than before.

1776
Limited
government

Smith said that government should be limited to national defense, public works like roads, police, and providing a system of justice to protect individual rights, particularly property.

He said that when the government does more than that, it causes unintended consequences that do more harm than good. He also recognized a harmful effect of the specialization of labor, namely that people tend to see the world only from the very narrow perspective of their job

A country's
wealth isn't
gold, but its
economy

Smith described his book as "a violent attack on the whole commercial system of Great Britain."

He said that the wealth of a country was not its stock of gold and silver (ref. 1569) but its economy. He said consumption was the sole purpose of production and the interest of the producer ought to be tolerated only to promote consumption. He said that capitalism generated a great inequality of wealth. (Same 2013-**Piketty**) A government [run by] merchants is, perhaps, the worst of all governments for any country whatsoever." **Smith** was the first to describe the labor market.

Merchants
conspire

Smith described the "mean rapacity" of the rich and the hypocrisy of advocates of unregulated capitalism. He identified greed as the greatest impediment to national prosperity. He advocated a graduated income tax, a limit on inheritances, advocated what is now called a living wage.

He said, "People of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public, or in some contrivance to raise prices."

Adam
Smith

He advocated unregulated capitalism to free every man's economic initiatives and ambitions ("*laissez faire*" economics, "*Let it (business) go forward*"), to produce the overall greatest good, although he himself never used the phrase. Trade monopolies hampered the natural

1776 growth of industry and trade. He said, "All for ourselves and nothing for others" seems, in every age, to have been the vile maxim of the masters of mankind. If a foreign country can

supply us with a commodity more cheaply than we ourselves can make it, better buy it.”

Capitalism: The new middle class capitalists embraced the *laissez faire* small government philosophy described by **Adam Smith**, opposing any government regulation of their business practices as well as fighting any labor organizing. One industry he said needed government regulation, banking. Capitalism endured as the population was dispersed and unorganized. As England’s wealth came from buyers abroad, Parliament had little incentive to pay attention to the voteless masses.

Laws are to defend the rich.

Capitalism: **Smith** knew the cruel inequities of capitalism. He said, “Civil government, so far as it is instituted for the security of property, is in reality instituted for the defense of the rich against the poor, that is, those who have property against those who have none.

15% of England’s GNP

Capitalism: Shares in the East India Company, which had under 2,000 shareholders and earned 15% of England’s GDP, returned 30% per year. The Royal African company, which controlled Britain’s trade in gold, silver, timber, and slaves, had 200 shareholders,

The rich love to parade their riches.

Smith, “To found a great empire is a project altogether unfit for a nation of shopkeepers; but extremely fit for a nation whose government is influenced by shopkeepers.”

Science is the antidote to “the poison of superstition”

“With [most] rich people, the chief employment of riches consists in the parade of riches, which in their eye is never so complete as when they appear to possess those decisive marks of opulence which nobody can possess but themselves.” (In 1899, **Thorstein Veblen** named this trait of the rich “conspicuous consumption.”). **Smith**, “Man is an animal that makes bargains. **Smith** also said, “Science is the great antidote to the poison of enthusiasm and superstition” (religion) Romantic love is ridiculous.” **Hume** and **Smith** did not believe that human reason is strong enough to control human selfishness; most of the time our reason merely rationalizes our selfishness.

Brits’ unfair trade policies

Re the American colonists, **Smith** said that British regulations limiting the freedom of colonies to engage in manufacture or trade were “a manifest violation of the most sacred rights of mankind.” The book was read by America’s ruling class, who were to write the *U S Constitution*.

It created economics as a separate social science. Ironically, the opposite of *laissez faire*, namely strict control over all aspects of trade by local governments and guilds was the prevailing economic system for hundreds of European town and cities.

Decline and Fall of the Roman Empire.

The third important document of 1776: **Edward Gibbon** (1737-94) (ref AD 410) Brit, MP and prominent historian, issued *Volume 1* of *The History of the Decline and Fall of the Roman Empire*.

It is the definitive account of the Roman Empire from the end of its golden age to its fall. It started secular history. **Gibbon**: “After a long analysis I can discern four principal causes for the ruin of Rome which proceeded over a period of more than one thousand years. 1. The injuries of time and nature. 2. The hostile attacks of the Christians and barbarians. 3. The use and misuse of the materials. and 4. The domestic quarrels of the Romans.” (Vols. 2-3 in 1781.)

Virginia

June: Virginia had adopted a Declaration of Rights, written principally by **George Mason** (1725-92). a prominent Virginia politician, friend and neighbor of **George Washington**, and a large land owner, slave owner, and delegate to the *Continental Congress*.

Declaration of Independence

July, America, Independence: By July, almost 100 colonies and towns had issued declarations of independence. The colonies routed their royal governors Some wealthy men were fleeing.

Paine and Jefferson

This Second Continental Congress had been meeting since April 1775 in Philadelphia, with delegates from all the 13 colonies. **Thomas Jefferson** (ref.1774) a delegate, **John Adams** (Northern non-slave owner), **Franklin** (owned 5 household slaves) and two others, wrote the fourth powerful document of 1776, the *U S Declaration of Independence*, using the *Enlightenment’s* Euclidian (self-evident) concepts of *natural rights*. **Thomas Paine** wrote much of the first draft. It was similar to **Jefferson’s** 1774 *A Summary View of the Rights of British America*.

All men are equal before the law life, liberty and the pursuit of happiness

Its style was that of a common law pleading. It was influenced by Holland’s 1581 *Oath of Abjuration/Abandonment* from Spain, by **Mason’s** *Virginia Declaration of Rights*, by local colonies declarations of independence, by the writings of **Paine** and **Locke** (“All men are by nature free and equal. Governors are servants of the state.”), and also by **Smith’s** *Wealth of Nations*: 1. “We hold these truths to be *self-evident*” (**Jefferson’s** first draft had said “*given by our Creator*.” **Franklin** changed it to *self evident*). “That all men are created equal; that they are endowed by their Creator with certain unalienable rights, life, liberty and the pursuit of happiness.” (**Locke** was known

Duty to revolt

for saying "life, liberty, and *property*," he had *once* used "life, liberty and the pursuit if happiness."

2. Governments are instituted to secure these rights. (**Locke**, Government's job is to protect *property*.)

3. "A government is legitimate only when it continues to secure these three rights." (**Locke**).

4. "The people have a duty to revolt when government becomes destructive of these ends."

(**Locke**, "Governments derive their just powers from the consent of the governed.")

These words were almost straight out of *Locke's Second Treatise*.

The final entry on the list of indictments of King **George 3** was. "He has excited domestic insurrections amongst us, and has endeavoured to bring on the inhabitants of our frontiers, the merciless Indian savages, whose known rule of warfare is an undistinguished destruction of all ages, sexes and conditions." When signing the *Declaration*, **Franklin** said, "We must indeed, hang together, or assuredly we shall hang separately."

Criticism of slavery deleted

Jefferson's first draft had condemned the slave trade as an "execrable commerce" and slavery as a "cruel war against nature itself." But, delegates from Georgia and South Carolina refused to sign the Declaration until criticism of slavery was removed. It was removed.

Jefferson's mistress was the biracial half sister of his deceased wife and a slave.

Independence

So, on July 4, after over a year at war under **Washington**, the *Second Continental Congress* declared America's independence. Caribbean sugar plantations were then far more important economically to England than the American colonies' products, mainly tobacco. America then had about 2.8 million; England about seven million. Mexico City was larger than any American or European city except Paris and London. The *Declaration* had four semi-religious references, "the laws of Nature and Nature's God," "Creator," "the Supreme Judge of the world, " and "divine Providence." These words were usually used for the God most popular with *Enlightenment* intellectuals, the Deist God, not to the Christian God.

Whigs in Parliament said that they would not vote for supplies for a war to oppress Americans.

1776
Abigail Adams's pleas were ignored.

Women were ignored: **Abigail Adams**, wife of **John Adams**, wrote him, "In the new code of laws which I suppose it will be necessary for you to make, I desire you to remember the ladies and be more generous and favorable to them than your ancestors. Remember, all men would be tyrant if they could." Despite her plea, neither the *Articles of Confederation*, the *Constitution*, or the *Bill of Rights* "remembered the ladies."

Ben Franklin, famous and prestigious in Europe, went to France to seek French support for the war. France began secretly supplying the rebels with military supplies and did so throughout the war.

Lafayette

A young French Marquis **de Lafayette**, from a military family, who had been made an officer in the French Army at 13, came to New York and fought with the revolutionaries. He was made a Major General at 19, but initially not given American troops to command. He was wounded at the Battle of Brandywine (Sept. 1776) and he fought with distinction in the Battle of Rhode Island.

Voltaire Quotes.

"The virgin birth, born of paganism, adopted by Judaism, invested the Christian Church from earliest times." "Nothing can be more contrary to religion and the clergy than reason and common sense..

"All Fathers of the Church, without exception, believed in the power of magic. The Church always condemned magic, but she always believed in it. She didn't excommunicate sorcerers as madmen who were mistaken, but as men who were really in communication with the Devil."

"Most of the great men of this world live as if they were atheists."

Voltaire Quotes

The *Dictionnaire* defined *Atheist* as "The name given by theologians to whomever differs from them regarding the divinity." "The love of God is frequently but the fear of the Devil."

Governmental reaction was quick. The Parliament of Paris immediately had the book burned by their hangman. Calvinists denounced it. The Vatican put it on *Index*. The greatest of all sins is to be wanting in faith, . . to question its opinions,. . . and to disdain its holy things. Superstition

The war was not going well

American Revolutionary War: **Paine** traveled and fought with some of the militias. Privates were paid \$6.66 per month, Colonels \$75. **Paine's Common Sense** became an inspiration to all **Washington's** men. **Pierre-Augustin Beaumarchais**, French, with the French king's confidential OK, supplied the

Washington: We must conquer or die.

rebels using a fictitious company to move tens of thousands of desperately needed muskets, uniforms, tents, and other supplies, as well as tons of gunpowder and vast sums of money to the Americans. These supplies proved critical in keeping Washington's struggling army in the field through 1777.

France gave arms, money, individual volunteers, diplomatic support in Europe,

In August, **Washington** said to his men, "The fate of unborn millions will now depend, under God,

on the courage and conduct of this army. Our cruel and unrelenting enemy leaves us only the choice of brave resistance, or the most abject submission. We have, therefore, to resolve to conquer or die." Most of the militiamen had copies of *Common Sense*. It sustained them. England hired Hessian mercenaries.

Paine to the rescue.
An American Crisis

December: The fifth important document of 1776, was Paine's second pamphlet, *An American Crisis*.
"These are the times that try men's souls. The summer soldier and the sunshine patriot will, in this crisis, shrink from the service of their country; but he that stands it NOW deserves the love and thanks of man and woman. Tyranny, like Hell, is not easily conquered." "Fear is the foundation of most governments." "We fight not to enslave, but to set a country free, and to make room upon the earth for honest men to live in." **Washington** read it to his men at Valley Forge. It worked. The rebels fought and won.

1777
Articles of Confederation

Political Theory: The *Articles of Confederation* were written as the first organizing document of America. It provided that each state was sovereign and independent. The war went on even though the *Articles* were not ratified. It established a weak central government. (It came into force only on March 1, 1781, after being ratified by all 13 colonies.) **William Pitt** told Parliament, "You cannot conquer America." He made a plea for peace with the American colonists.

England

Political Theory, aristocracy: **Montesquieu** (ref. 1748, '51) and **William Blackstone** (ref. 1765), the learned jurist, saw the English unwritten constitution as a balanced system with the king and Parliament checking each other. **Paine** said it was simply a combination of two ancient tyrannies compounded with "new republican materials." **Paine** urged unicameral legislatures for each colony and the nation. He advocated the separation of powers as he had previously written for the *Pennsylvania Magazine*. He also spoke for women's rights and against slavery.

How we think

Joshua Reynolds (1723-92), Brit. painter, dominated British artistic culture in the mid 18th century. "The study of history oughtn't be limited to one art. Many things are learned by the analogy of one art to another, which wouldn't have been realized if the inventor hadn't gotten hints from a sister art."

1777
Law Lord Kames: We sit here to enforce right, not to enforce wrong.

Slavery, justice, Scotland: **Joseph Knight**, a slave in Jamaica whose owner took him to Scotland, sued for his freedom. The Sheriff of Perthshire ruled that "the regulations in Jamaica, concerning slaves, "do not extend to this kingdom," and more important, that, "the law of Jamaica, being unjust, could not be supported in this country." On appeal, Scotland's highest civil court, the *Court of Session*, upheld the sheriff eight to four. It said, "Slavery is not recognized by the laws of this kingdom." It denied the slave owners claim to perpetual service. Law Lord **Kames** stated that "We sit here to enforce right, not to enforce wrong. Jamaican law [written by British slave owners], being here unjust, could not be supported in Scotland." In England, the slave trade continued with conflicting and inconclusive court decisions.

1777
Battles of Saratoga

September, October: The turning point in the war for the revolutionaries were two battles at Saratoga where the British Army down from Canada was defeated by a smaller group of rebels with Pennsylvania sharpshooters firing from concealed places into British soldiers lined up in a row. 8,000 British soldiers surrendered. This rebel victory led France to sign a formal alliance with the rebels and French covert aid became open.. Almost all the major Indian tribes fought for the Brits

The Age of Paine

Many colonists stayed loyal to the king. **John Adams**, Boston lawyer and revolutionary, favored independence but disliked **Paine**. Nonetheless, he said that he knew of no one in the world with more influence in world in the last 30 years than **Paine**. He called it "*The Age of Paine*."

Sidney Hook, head of the dept. of philosophy at NYU 1948-69, said, "If any man is entitled to be the father of American independence, it is **Thomas Paine**."

1778
Samuel Johnson Quotes

Samuel Johnson: "I am willing to love all mankind, except an American." "The true measure of a man is how he treats someone who can do him absolutely no good." "Knowledge without integrity is dangerous and dreadful" "The insolence of wealth will creep out." "Nothing has more retarded the advancement of learning than the disposition of vulgar minds to ridicule and vilify what they cannot understand."

Air was thus known to be made of different gasses.

1778
Chemistry: The relationship between combustion and breathing had long been known from the air's role in both processes. **Lavoisier** extended his new theory of combustion to include the area of respiration. The revised "official" version of **Lavoisier's** 1775 Easter Memoir *On the Nature of the Principle Which Combines with Metals* repeated some of his and **Priestley's** experiments. It showed that that part of common atmospheric air, called "residual" air, didn't burn and could not be breathed. Common air was thus seen to be a mixture of two distinct chemical species of gas with quite different

properties. **Lavoisier** called **Priestley's** gas oxygen, Greek, acid-forming). The revised version said that the part of common air that did burn was "the healthiest and purest part of the air."

1778 Catholic fear of learning: **Buffon** (ref. 1749), wrote that the Earth was at least 75,000 years old. He also posited that the earth started hot and was gradually cooling. Sorbonne theologians again made him recant.

1778 Voltaire's death: In February **Voltaire** returned to Paris for the first time in over 25 years to see the opening of his latest tragedy, *Irene*. The five-day journey was too much for the 83-year-old. He believed he was dying. He wrote, "I die adoring God, loving my friends, not hating my enemies, and detesting superstition." He recovered, and in March saw *Irene* performed, where he was treated by the audience as a returning hero. He became ill again and died in May. Authorities stupidly denied him burial in Paris.

Voltaire's letters all ended with "*Ecrasez l'infâme! / Crush the infamous thing*," (It was usually seen to refer to superstition, clericalism, or ecclesiasticism).

Praise for
Voltaire

Macaulay (ref 1833) said of **Voltaire**, "His mockery was the most terrible intellectual weapon ever wielded."

Concordet: (1795): **Voltaire** "felt called upon to destroy every kind of prejudice that enslaved his country."

Robert Ingersoll: (1870) "**Voltaire** did more for human liberty than any other man who ever lived."

Frederick the Great to **Voltaire**: I learn more from your doubts than from **Aristotle, Socrates, & Descartes**.

**Bill for
Establishing
Religious
Freedom.
Opinions
are private.**

Political Theory, democracy: Speaking for the *Bill for Establishing Religious Freedom* in the General Assembly of Virginia, **Jefferson** said, "The opinions of men are not the object of civil government, nor under its jurisdiction...to suffer the civil magistrate to intrude his powers into the field of opinion and to restrain the profession or propagation of principles on supposition of their ill tendency is a dangerous fallacy, which at once destroys all religious liberty . . . and finally . . . truth is great and will prevail if left to herself."

(In November, an act to abolish slavery was proposed to the Pennsylvania Assembly. **Paine** wrote the preamble. So he wrote the first *Proclamation of Emancipation* in America. It became Pennsylvania law in 1780. John Dickinson, abolitionist: "Freeing the slaves if rightly done is more of advantage to the master." Anthony Benezet: "The worst effects of slavery flow to the religions and morals of those who practice it."

1779 Botany: **Jan Ingenhousz** (1730-99), Dutch, Plants absorb oxygen at night and emit it in the daytime.

**Hume's
answers
to the
Design
Argument**

Philosophy: **Hume's** (ref. 1739 41-42, '44, '48, '51, '55, '61-62), *Dialogues Concerning Natural Religion*, a classic text on theodicies, was published three years after he died anonymously as it was considered too sacrilegious. **Hume**, a friend of **Ben Franklin**, critiqued the *Design Argument for God*, earlier advocated by **Aquinas** (1273) and **Leibniz** (1710).

Hume articulated several independent refutations of the *Design Argument*. They are:

1. The Design Argument posits a false dilemma / limited choice. Namely, Was the world designed or did it happen by chance? The *Design Argument* says order in the universe can only come from someone's design; but there are many natural causes of order in the universe.

The order in the universe is simply the manifestation of causality, which is a derivative, a logical corollary of the law of identity." A correct and unnamed alternative question is, Did the Earth change naturally? (Limiting an answer to just two choices is a logical fallacy. p. 443).

(**Stuart Chase**, "If you let an enemy select the terms of the argument, he has already won it. And **Johnny Carson**, re the success of a comedy sketch, "You buy the premise; you buy the bit.")

**2. Analogies
can
mislead**

2. **Hume**: The *Design Argument* is based on a misleading analogy: Analogies are trustworthy only when the matters are similar. Human-made objects, i.e., a watch, are in fact designed, but natural objects evolve naturally without a divine designer. They are not analogous to manufactured items.

**3. Design,
even if true,
does not
infer a god.**

3. **Hume**: "Even were the *Design Argument* completely accepted, it does not lead to any particular god or even a competent or moral designer; only that some time in the past something designed the universe. One could easily conclude that the universe's configuration was the result of some morally ambiguous, possibly unintelligent agent or agents, whose methods bears only a remote similarity to human intelligence."

**4. Anything
could be a
1st cause**

4. **Hume**: "What peculiar privilege has this little agitation of the brain we call 'thought', that we must make it the model of the whole universe?" He argued that *a priori* arguments designed to prove God's existence were inconclusive and establish only that *something*, not necessarily God, may have been a first cause.

**5. Suffering
disease,
pain,**

5. **Hume**: The *Design Argument* does not demonstrate with logical certainty that the universe was *designed*. **Hume** asked how we could be sure that the world was not created by a team, or that it is not one of many attempts at creation, or that our world was not "the first rude essay of some

disorder, famine, must be evidence for a stupid designer.

infant deity, who afterwards abandoned it, ashamed of his lame performance.”

“If the well functioning nature is evidence for intelligence, benevolence, and power; then disease, pain, parasites, disorder, famine, and natural evil is similarly evidence for stupidity, malice and impotence. If this world is the best the designer can or will do, he must like suffering. Heaven, with the same designer, must be just as bad.” “Suffering, disease, and privation afflict billions.

Do these facts show good design?” This is the *Underachiever Problem* of the *Design Argument*.

Charles Darwin later rejected the *Design Argument* because of the world's faulty design.

Kant: Being a mere designer is not enough. To be theologically adequate, a God must be all-everything.

These Hume arguments against the *Design Argument* also argued against the existence of God.

Hume articulated the Problem of Suffering

Hume articulated *The Problem of Suffering/Evil* as, “Is [God] willing to prevent evil, but not able? Then is he impotent? Is he able, but not willing? Then is he malevolent? Is He both able and willing? Whence then is evil?” Hume here phrased the *Problem of Suffering/Evil* as a “holiness” problem for a God. But he also gave a Natural Theology argument. He said, “The world is so full of hardships and dangers it could not have been created by a omniscient and omnipotent entity.”

Hume asked, “Is the world, considered in general and as it appears to us in this life, different from what one or such a limited being, would, beforehand, expect from a very powerful, wise, and benevolent deity?” “It must be strange prejudice to assert the contrary. And from that I conclude that, however consistent the world may be, allowing certain suppositions and conjectures with the idea of such a deity, it can never afford us an inference concerning his existence.”

6. We can't know if it's the best

6. “To conclude ours is a well ordered universe, we would have to know a range of different universes to see if ours is actually that well designed. As we don't know other universes, the analogy cannot be considered valid.” [*Candide*, “If this the best of all possible worlds, what are the others like?”]

7. What was his purpose?

7. We should know what the designer wanted to accomplish to see if the universe is well ordered for such purpose. But that assumes that the designer exists, the very matter the argument is supposed to prove. The *Design Argument* is thus a circular argument, it assumes the conclusion.

8. Trial and error made humans

8. Often what appears to be purpose, where it looks like an object has a particular feature to secure some particular outcome, is better explained by understanding that the object wouldn't be around if it didn't possess that feature, and the outcome is only interesting to us as a human projection of goals onto nature. He said humans are the result of trial and error. This is *Natural Selection* 90 years before Darwin.

9. Design is just a preference.

9. The *Design Argument* is natural, but it is not scientific, as it facilitates no new predictions. It merely represents a primitive preference for explaining the unknown in terms of a designer rather than in terms of natural law, which Leibniz did not show was insufficient. The *Design Argument* sees the world as a finished design, but this is false as the world is an ongoing process.

10. Designer

10. If a well ordered world needed a designer, then the designer's mind, being well ordered, also needed a designer, which needed a designer, etc. This is an infinite regress.

1779 Hume's *Dialogues* also criticized Leibniz's theodicy that evil doesn't exist or that there are only “apparent” evils. He said that is plainly contrary to human experience. The distinction between good & evil depends on the natural sentiments of the human mind. These feelings can't be altered by any philosophical theory.

Induction isn't 100% certain

In *Dialogues*, he wrote, “All that belongs to human understanding, in this deep ignorance and obscurity, is to be skeptical, or at least cautious, and not to admit of any hypothesis whatever, much less of any which is supported by no appearance of probability.”

So, being skeptical, he rejected induction, because, unless the premises are certain, the conclusion is not certain, perhaps high probability, even enough to act on, *practical certainty*, but not 100%. This hit at the heart of *rationalists*. He addressed the evidential *Problem of Suffering* two ways, in terms of its prior probability and the likelihood of needless suffering.

Hume: Four ways a God could have made a world with less suffering

Four ways to make a better world: *Dialogues* also described four basic unnecessary and avoidable circumstances which cause the most suffering in the world which a perfect God would have prevented. 1. Avoidance of pain and pursuit of pleasure excites creatures to action. 2. Conducting the world by general laws. “Might not the Deity exterminate all ill. . .and produce all good..(This is the *Problem of Suffering*.) One wave, a little higher than the rest, by burying Caesar. . . might have restored liberty to a considerable part of mankind.” 3. The great frugality with which all powers and faculties are distributed to every particular being. Swift animals are generally weak

when caught. The weakest species, man, has the greatest intellect to survive and prosper.

Ways to reduce suffering.

4. "The inaccurate workmanship of all the springs and principles of the great machine of Nature whose removal would not produce a visible defect and disorder in the whole." Winds are necessary to push ships, but no wind is destructive, as are great winds. Rain is necessary to nourish plants, but no rain causes starvation and great rain causes flooding."
Hume thus refuted Leibniz's claim that God made the best of all possible worlds. So an omniscient God knew these circumstances when creating the world. He could have made a much better world.

Speculating doesn't prove God

Hume rejected Skeptical Theism's theory that God is moral in ways one cannot understand saying that a mystery is insufficient, "We must be Empiricists, not speculators." Hume felt that there is too much evil for a good deity, and too much good for an evil deity, and too much regularity in the world, not multiple deities.

The Catholic Assembly of the French Clergy condemned the *limited* tolerance that Louis 15 granted to Protestants, and petitioned Louis not to give Protestants any further privileges (which they had).

Jeremy Bentham
Utilitarianism

Philosophy, Political Theory, utilitarianism: Jeremy Bentham (1748-1832), Brit. philosopher, jurist, social reformer, founded modern utilitarianism. He published *An Introduction to the Principles of Morals and Legislation*. Bentham defined as the "fundamental axiom" of his philosophy the principle that "The greatest happiness of the greatest number is the measure of right and wrong."
Bentham: The moral rightness of an act is determined solely by its consequences.
Actions are good or bad only as they led to pleasure or pain."The calculation is secular

Principles of Morals and Legislation

Bentham: "Nature has placed mankind under the governance of two sovereign masters, pain and pleasure It is for them alone to point out what we ought to do, as well as to determine what we shall do. On the one hand the standard of right and wrong, on the other the chain of causes and effects, are fastened to their throne. They govern us in all we do, in all we say, in all we think."

John Stuart Mill had a problem with Bentham

A problem: Bentham accepted acute pain for a few if it assisted a greater good for the many. Deciding what is "good" or knowing what will make the most people happy can be most difficult. Acute pain for a few troubled one of his most important and faithful adherents, John Stuart Mill. (See 1835-Mill).
Another problem, If consequences is the sole measure of goodness, a rich man giving a poor man £10 is worthier than a poor man giving his last £5 to a beggar. The field of ethics addresses such issues.

1780 To Bentham, social problems could be solved scientifically. Utilitarianism was appealing in its apparent simplicity and democratic appeal. Religion was irrelevant to calculating the "greatest good for the most people." Also "Every law is contrary to liberty." He asked, "How good is the law?"
How can it be improved? His common sense theory led to proposals for reforming laws, improving schools. The penal code and the poor laws were reformed with utilitarianism in mind.

Bentham liberal ideas

He was way ahead of his time. He advocated for individual and economic freedoms, the separation of church and state, freedom of expression, equal rights for women, such as the right to divorce, the abolition of slavery and the death penalty, and of physical punishment, including that of children. He advocated for animal rights. Only 4% of English adults could vote.
Bentham favored extending individuals' legal rights. He opposed "natural law" and "natural rights" as "divine" or "God-given"; he called them "simple nonsense." He criticized legal fictions. He influenced the prison reform, schools, poor laws, law courts, and Parliament.

1780 Bentham wanted to create a complete utilitarian code of law. He not only proposed many legal and social reforms, but had his underlying moral principle on which they should be based, his idea of the greatest happiness of the greatest number. Bentham borrowed this concept from Priestley. (Priestley had only advocated "the good and happiness of the majority of the members of any state.") Francis Hutcheson in 1725 had said, "the greatest happiness of the greatest number" (More Bentham 1809)

The Industrial Revolution was a social revolution
1780

The Industrial Revolution: The most important technological invention of the 18th century was the factory system with division of labor and men working with machines powered by steam. Manufacturing moved from the home to factories. Factories, coal, steam engines, canals (England had 4,000 miles of canals), water mills, child labor, (all centered in Manchester), with the port Liverpool, caused a huge increase in knowledge. It was, like the US and French revolutions, basically a social revolution.

China had no industrial revolution

It established the middle class as the dominant class in politics and society. Liberalism and free enterprise ruled. The big increase in production from factories led to a large increase in

as it had no competitive culture.	transportation, especially railroads and steamships. Steel was developed (It's an iron carbon alloy.) This occurred in the West, not China, as the West had a culture of competitive scientific and intellectual advancement whereas China was a unified empire run by a single Mandarin bureaucracy of Confucian "meritocracy". China had no Galileo or Descartes or Newton who challenged the status quo.
Power/ energy was a new idea in science	Power/ energy was a new idea in science. Peter Atkins explained, "The essence of a steam engine is a concept that applies across the range of all events. The steam engine epitomized all change through the 19 th century and was fulfilled in the early 20 th century.
British Empire, "Rule Britannia"	Self-made practical <u>middle class men managed the factories</u> , invented and built the machines, not aristocrats, as Oxford and Cambridge, England's only two universities until 1826, mainly taught the classics to nobles comfortable with their tenants' rent. England, with 2% of the world's people, produced 20% of the world's manufactured goods, shipped them worldwide (a nation of manufacturers and shopkeepers). This was the British Empire.
Northwest Europe advanced socially and intellectually	<u>Society</u> : In Northern Europe, societies were becoming freer and more open. But around the Med, women remained chattel. In the more advanced North Europe, women had <i>some</i> rights. Salons, clubs (including the Freemasons), and coffeehouses (550 in London) were intellectual and social centers, all breaking up the ice of tradition and convention. Literacy grew, mainly in cities. East of the Elbe, authoritarian governments ruled illiterate peasants.
1780-1	<u>American Revolution</u> : In 1780, Lafayette returned from France and was given command of French troops helping the rebels. 6000 French troops arrived in Rhode Island. In March 1781, the <i>Articles of Confederation and Perpetual Union</i> was ratified by all the states and came into force. Washington moved the French troops to Virginia where Cornwallis's army was. The French fleet arrived in Virginia waters and isolated Cornwallis , who surrendered at Yorktown, Virginia in October, ending the war. Jefferson : on the necessity of the war, "The tree of liberty must be refreshed from time to time with the blood of patriots and tyrants. It is its natural manure." John Adams said, "History will ascribe the revolution to Thomas Paine . "Without the pen of Paine , the sword of Washington would have been wielded in vain." The <i>Articles of Confederation</i> preserved the independence and sovereignty of the states. So the US central government was weak, with only those powers which the former colonies had recognized as belonging to king and parliament. Little changed politically once the <i>Articles</i> went into effect, as ratification did little more than legalize what the <i>Continental Congress</i> and the colonies had been doing.
The <i>Articles of Confederation</i> preserved the independence and sovereignty of the states.	
"Rome declined due to the disease of Christianity"	<u>History</u> : Edward Gibbon (ref 1776) published <i>Volumes 2 and 3 of The Decline and Fall of the Roman Empire</i> . <u>Volume 3 was highly controversial as it blamed Christianity for the fall</u> It said, "I have described the triumph of barbarism and religion. . . <u>Rome declined due to the disease of Christianity</u> . The Church's insistence that only Christianity be practiced (unlike pagans) "appears to have infused a spirit of bitterness into a system of love and harmony" of Rome." He gave 5 causes of the survival and triumph of the Christian Church, 1. Its flexibility and zeal. 2.the promise of heaven, 3. The miraculous powers ascribed to its primitive church. 4. The pure and austere morals of Christians, 5. The discipline and unity of its organization. Gibbon compared Christianity invidiously with both the pagan religions of Rome and Islam. He was attacked as a "paganist." He was also critical of Judaism. He said that Tertullian had exulted at the tortures in Hell of ancient rulers when God would end the world. Historian S P Foster says that Gibbon <u>blamed the non-religious preoccupations of Christianity for the decline</u> , heaped scorn and abuse on the Church, and sneered at monasticism as a dreary, superstition-ridden enterprise. Gibbon was brought up an Anglican, converted to Catholicism, then to Calvinism, then to Voltaire's skepticism, whom he met.
The decline and fall took several decades.	
1781 Christianity is a fanatical cult	Gibbon also said <u>Christianity was a fanatical cult</u> which tortured far more than they had lost in wars. "The Church of Rome defended by violence that which it had acquired by fraud." "Catholics had killed far more Protestants in a single province in one reign than all its martyrs killed by Romans in 300 years."
Gibbon Quotes	"A cruel unfeeling temper has distinguished the monks of every age and country: their stern indifference, which is seldom modified by personal friendship, is inflamed by religious hatred; and their merciless zeal has strenuously administered the holy office of the Inquisition." <i>Vol. 4-6</i> were printed in 1788-89. <i>Vol. 4</i> developed the <u>concept of Europe as one great republic superior to other civilizations.</u>
Kant had to deny	<u>Philosophy</u> : Kant (ref. 1076, 1686, 1734, '49, '55) published <i>Kritik der Reinen Vernunft / Critique of Pure Reason</i> : The two major scientific schools of the day were British <i>Empiricism</i>

knowledge to have faith (Locke, Berkeley, Hume) and *Continental Reason*. Both schools deny a deity. In it, Kant wrote, "I have therefore found it necessary to deny knowledge to make room for faith."

Critique of Pure Reason is the central text of modern philosophy. *Critique of Pure Reason* was an attempt to change the old procedure of metaphysics and to bring about a complete revolution. Michael Macrone explained that Kant said that "our minds never come into direct contact with ultimate reality because of the way our minds work and because the way our senses work and because our brains are prefitted with various concepts and filters. The "reality" we see is at least a step or two removed from things in themselves."

A priori knowledge is knowledge before any experience. So babies have built-in reasoning abilities. He wanted to answer the "reality" we see question, "How are synthetic a priori judgments possible?" Kant said it was "a critique of the faculty of reason in general, in respect of all knowledge after which it may strive independently of all experience" and that the aims to reach a decision about "the possibility or impossibility of metaphysics."

Pure Reason said that to establish the possibility of metaphysics as a science, man's mind must have a priori built-in reasoning ability, synthetic a priori truths. Synthetic a priori truths are universally and necessarily true a priori, but their necessity cannot be derived by analysis of the meanings of such truths, hence they are synthetic.

Kant said that by a "critique of pure reason" he meant a critique "of the faculty of reason in general, in respect of all knowledge after which it may strive independently of all experience." *Critique of Pure reason* is the central text of modern philosophy

Skepticism He wrote it to counter Hume's assertion that we can't really know if a thing is true solely by observation, as causality can't be proved in a reliable way. In short, a purely sensory base of knowledge is inadequate. His view led to skepticism. Kant said that Hume's extreme skepticism and empiricism don't explain how the achievements of mathematics were possible.

Locke's most important book. one of the most influential books in the history of philosophy (Locke had said babies' minds were a blank slate.) It is an important investigation into the nature of human reason. It was Locke's most important book and one of the most influential books in the history of philosophy. Kant agreed with Locke that knowledge depends on experience and all our knowledge is within the bounds of possible experience, but that this did not necessarily mean that one did not have and apply twelve certain inborn /a priori abilities of the mind, like unity, substance, quantity space, time, and causality. These are not arbitrary abilities but basic operations of thought inherent in one's mind, through which we filter all experience and which imposes its own order on the world of phenomena.

Kant: So, as some abilities are a priori, a child can reason before experience. That is, by virtue of the forms and categories inherent in the mind, man can reason coherently and intelligently. For Kant, space and time were a priori forms of human sensibility. Knowledge consists in organizing the chaotic things that we experience into a ordered world (a world where the dots are connected by natural laws).

1781 Kant killed Anselm's Ontological Argument. *Ontological Argument*: Kant explained how he killed Anselm's *Ontological Argument* and the *Design Argument*. Kant called Anselm's ontological argument, a "miserable tautology." He said for Anselm God meant both God and the idea of God, and Anselm's "proof" confused the two. He argued that Anselm used two distinct realms of thought- pure reason, deduction, in which true premises insure true conclusions, and that of induction, where we reach conclusions based on experience. 'Being' is obviously not a real predicate; that is, it is not a concept of something which could be added to the concept of a thing. ... By whatever and however many predicates we may think a thing ... we do not make the least addition to the thing when we further declare that the thing is

Anselm assumed, not proved, a God. Kant said that existence was not a predicate, "Existence is not perfection." Postulating that things exist and concluding they exist is circular reasoning and thus meaningless. Said Anselm's argument does not prove there is a God. It simply assumes there is a God. "While we may conceive of God as having the property of, for example, being omnipotent, existence is not a property of a thing."

Suppose that one gives a complete description of an object, size, weight, chemical composition, to then add that the object exists does not add anything to the object or its concept.

1781 Existence says nothing about an object To say an object exists says something about the world, that the world contains something that matches the concept of the object, but does not say anything about the object itself. With premise two gone, the *Ontological Argument* fails. Alternately, he argued as Guanillo had, substitute Utopia for God. "Utopia is the most perfect society conceivable. It is more perfect to exist than not exist. Thus Utopia exists." This conclusion is clearly false. Schopenhauer (1819) called Anselm's argument "a charming joke."

Kant also refuted Descartes' Ontological Argument

Descartes had also devised an *Ontological Argument*. (ref.1644) He had argued that God had existence in the same way as a triangle has three sides. **Kant** replied that if you had a triangle then you did indeed have an object with three sides. But if you do not have the triangle, you have neither its three angles or its three sides. If you accept that there is a God, one can logically assume His existence is necessary. But you don't have to *assume* that there is a God.

Kant refuted the first cause argument 1781

Cosmological Argument: **Kant** also argued that the *Cosmological Argument* has the same error. It pastes the tag of "existing" on things; then asserts the existence of a thing requires the existence of an ultimate being. The *inference* of a first causer, God, in *Cosmological Arguments* like **Aquinas's** five proofs, is simply the *Ontological Argument* repeated four times, which he'd shown false. Only observation and experience can determine that things exist.

Even though these arguments negated God, Kant was a believer.

Kant said the *Design Argument* seems reasonable but doesn't accomplish much, as a God can not be just a designer. To be theologically adequate, God must be all-everything, powerful, etc. But the suffering in the world negates the all-everything claims for the Abrahamic Gods. Even so, Kant was a believer. He wrote *Der einzig ögliche Beweisgrund zu einer Demonstration des Daseins Gottes / The Only Possible Argument in Support of the Existence of God*. Namely that the existence of God can be deduced from the existence of good.

Kant had so destroyed the last remaining proofs of God, that he was "the all destroyer." **Russell** (ref. 1912, '22, '27, '29, '50) in 1927 commented, "There used to be three intellectual arguments for the existence of God, all of which were disposed of by **Kant**. Yet, no sooner had he disposed of those arguments that he invented a new moral argument, and that quite convinced him."

Minister of Spiritual Affairs?

Kant's philosophy is a moving target. He was, up until 1786, under the protection of the liberal minded **Frederick**. **Frederick** was succeeded by the illiberal **Frederick William 2**, who appointed a **reactionary preacher named Woehler as "Minister of Spiritual Affairs" who forbade any deviations** from orthodox biblical doctrines and required all writings to get approval from official state censors.

Four racial categories

Using the *Four Temperaments* of ancient Greece, **Kant** proposed a hierarchy of four racial categories: white Europeans, yellow Asians, black Africans, and red Amerindians. "[Whites] contain all the impulses of nature in affects and passions, all talents. . . to culture and civilization and can as readily obey as govern." **Kant** also said that women could not reason capably or objectively, and lacked courage and strength. He never married.

Women can't reason

1782 People have a right of property in land

Land reform: William Ogilvie (1736-1819) Scot. "The rebel professor" published, anonymously, *The Right of Property in Land*, Everyone has a right to an equal share in the value of property in land. Land values have three parts, the original, the improved, and the improvable. The original and the improvable belong to the community, the second to the landowner, the value of whose and is the product of his labor. "When a child is born, we recognize that it has a right to its mother's milk and the same right to mother Earth . . . The monster that would deprive a babe of its mother's milk. . . is not more deserving of being destroyed than the monster who seizes absolute possession of more than his share of the common mother of mankind to the exclusion of his fellow creatures." His preaching was largely ignored.

1783 The class structure continued

American independence: The US, England, France, and Spain) signed *The Paris Peace Treaty*. The revolutionary war did not disturb the class structure of America. The wealthy continued to rule, with the militias and the clergy. The underclass, laborers, poor farmers, the propertyless, continued to sporadically protest, riot, or strike. **Paine** went to Europe and became an active supporter of the French Revolution.

1783 Mendelssohn

Reforming Judaism: **Moses Mendelssohn** (1729-86), a Berliner, published *Jerusalem*, or *On Religious Power and Judaism*. It said that the *Hebrew Bible* nowhere ordered *belief*, it only ordered *actions* or *non-actions*, allowing Jews to be unbelievers or deists. It praised **Socrates's** ability to say, "I do not know." **Mendelssohn** advised following local customs. He translated the *Torah* into German, advocated a Judaism more part of popular culture. He educated his three daughters. They all became intellectuals.

1783 Dark Star, Black hole

Astronomy, Physics: **John Michell** (1724-93), English, geologist, a cleric, postulated there were heavenly bodies with a gravitational pull so strong that not even light they might create could escape their gravity pull. He called it a *dark star*. (Later called "black holes.") He said such bodies had to be 500 times bigger than our Sun. He suggested that earthquakes traveled in (seismic) waves. He invented a device to measure the mass of the Earth, and explained how to make

an artificial magnet. (More **Michell** at 1796, 1850, 1915-6, 1973-4, '82, 2015).

Water consists of two gasses

In his lab, with **Pierre Simon Laplace** (ref.1799), **Lavoisier** (ref. 1775) repeated **Cavendish's** 1766 experiment and showed that water was not one element but a combination of two elements, both gasses, **Priestley's** oxygen and **Cavendish's** flammable air (**Lavoisier** named it hydrogen, Greek for water-forming). With **Laplace**, **Lavoisier** synthesized water by burning jets of hydrogen and oxygen in a bell jar over mercury. This showed that water was not an element, but was a compound of oxygen and hydrogen.

1783 "Chemistry Revolution"

Lavoisier often devoted time to improving the livelihood of the lower classes with his work in agriculture, industry, and the sciences. He read to the Academy a full-scale attack on the current phlogiston theory of combustion. His significance rests not on his discoveries, which were noteworthy, but on his systematic approach to chemistry, called the Chemistry Revolution.

His young clever wife, **Marie-Anne**, learned English to translate for him. She was a masterful lab assistant, she illustrated his papers and wrote up his findings. (Next **Lavoisier** 1788)

1783 Education: In America, **Noah Webster** (1758-1843) at 25, published the *Blue Backed Speller*. Its influence was stupendous. 70 million copies were eventually sold. (More **Webster** 1828)

Balloons

Physics, balloons: Brothers **Jacques** and **Joseph Montgolfier** floated a hot air balloon (with a rooster, a duck, and a sheep) six miles over Paris.

Two months later, **Jacques Charles** (1746-1823) & **Nicholas Roberts** flew a hydrogen filled balloon.

1784 Madison criticized Christianity

James Madison, (ref 1532, 1751-1836), future president, severely criticized Christianity and opposed tax exemptions for churches, "During 15 centuries . . . Christianity has been on trial, what has been its fruits? More or less, in all places, pride and indolence in the clergy, ignorance and servility in the laity, in both, superstition, bigotry, and persecution."

Religions harmed society.

"What influence have ecclesiastical establishments have had on society? In some instances they have erected a spiritual tyranny on the ruins of civil authority. In many instances they have upheld the thrones of political tyranny. Never have they been seen the guardian of the liberties of the people. Rulers who wish to subvert the public liberty may have found an established Clergy convenient. Religious bondage shackles and debilitates the mind and unfits it for every noble enterprise."

While anti-religions, he was not anti-slavery. Historian **Howard Zinn** wrote that after the revolution, he told a British visitor he could make \$257 per year on every slave with only \$12 or \$13 on its upkeep.

1785 **Kant** Ethics, **Kant's Foundations of the Metaphysics of Morals Upholding the Thrones of Political Tyranny**: **Kant** (ref. 1755, '81). Nothing is unconditionally good except the good will. The good will, which is the rational will, acts not merely in accordance with duty, but from duty."

The good will wills obedience to the moral law. Duty consists of observing his *categorical imperative*. He said physics is "the philosophy of nature, so far as it is based on empirical laws."

Muslim states in the Med.

The new United States: Tunis, Tripoli, Morocco, and Algiers were capturing American ships in the Med and ransoming their crews. Tripoli's envoy, **Sidi Haji Abdrahaman**, in London, told **Jefferson** and **Adams** that the *Qur'an* authorized Barbary states to capture and enslave anyone from nations that didn't admit Islam's religious authority, as such nations were sinners.

1786 Linguistics: **William Jones**, Brit, philologist, saw Sanskrit was similar to Greek and Latin. He deduced that they had a common ancestor.

1787 Physics: **Jacques Charles** (ref. 1783-balloon) French (like **Guillaume Amontons** (ref. 1699, 1701), saw that thermal energy / heat caused gasses to expand, but did not know how much nor did he publish his data. (**Gay-Lussac** in 1802 *measured* the expansion.)

1787 **Kant**, "Science is organized knowledge. Wisdom is organized life. I had to set limits to knowledge to make place for faith. . . Everything in nature acts in conformity with law." i.e., not scripture.

1787 Wolfgang Amadeus Mozart

Mozart: Wolfgang Amadeus Mozart (1756-91) Viennese, a genius, by 25 had written hundreds of works.. He wrote *Don Giovanni / Don Juan, an attack on religious intolerance* and the tragedy of a man whose only religion was knowledge, a new kind of tragedy.

Giovanni respects no virtues, laughs at society. The women he seduced want freedom and a

Don Juan's only religion was knowledge.

new adventure as much as he does. After seducing many women, the father of his latest lover challenged him to a duel. Giovanni easily killed him, but the man's ghost appears.

Giovanni says he has nothing to repent. In a crescendo, the fires of Hell consume him. He left his patron, the archbishop of Salzburg. Without a patron, **Mozart** died in poverty at 35.

1787 **Jacques Charles** and 1802-**Gay-Lussac**, *quantified* the pressure increase that **Amontons** saw when air was heated. They thus added temperature to **Boyle's** pressure/volume inverse relationship.)

Discontent among the lower classes

Political Theory, America: The business class saw the *Articles of Confederation* as inadequate. America, like Europe, was grossly unequal in wealth (land). Non-slave owners in the south, tenant farmers, and indentured servants, almost all illiterate, were abjectly poor or in debt and restless or rebellious. Slaves of course had nothing. In Massachusetts, **Daniel Shay** led a revolt of thousands of the poor farmers. The rich hired a militia and put it down. **Hamilton's** (ref. 1757, '76) "rich and well born" also feared that the people would take over state governments

1787 **Hamilton** wanted a monarchy, protection of property

Hamilton called for a *Constitution* to ensure protection of property, including protection from Muslim pirates in the Med. The *Congress of the Confederation* sitting in New York City, the then governing body of the confederation (with members appointed by state legislatures) authorized a *Constitutional Convention* in Philadelphia. Deputies gathered at the Pennsylvania State House (now Independence Hall), ostensibly to amend the *Articles of Confederation*..

Charles Beard in 1913 explained, "The movement for the *Constitution* . . . was originated and carried out principally by four groups whose personal interests had been adversely affected under the *Articles of Confederation*: money, public securities, manufacturers, and trade & shipping."

Debating the proposed Constitution.

George Washington, a deputy from Virginia, the revolutionary war hero, was the most famous and respected man in America. He was elected President of the Convention.

Some deputies, like **Madison** (ref 1784) and **Hamilton**, known as Federalists, argued for a more powerful central government and a new constitution. **Madison**: "The most common and durable source of factions has been the various and unequal distribution of property. Those who hold and those who are without property have always formed distinct interests in society. . . Democracies. . . have ever been incompatible with personal security or the rights of property." **Washington** said that without a new constitution, he didn't think the US would last long as a union.

Give the rich & well born a permanent place in government.

Hamilton wanted a monarchy. He told the deputies, "All communities divide themselves into the few and the many. The first are the rich and well born, the other the mass of the people. The voice of the people has been said to be the voice of God; however. . . this maxim. . . is not true. The people are turbulent and changing; they seldom judge or determine right. . . Give therefore. . . to the [rich and well born] a distinct, permanent share in the government."

"Mankind are vicious" "the impudence of democracy"

Can a democratic assembly. . . be supposed steadily to pursue the public good? Nothing but a permanent body can check the impudence of democracy. . . They will check the unsteadiness of the [masses]. . . Take mankind in general, they are vicious."

Religions sanctify private property.

William Livingston of New Jersey agreed. "The people ever have been and ever will be unfit to retain the exercise of power in their own hands, they must of necessity delegate it somewhere." (**Piketty** (1913, 2013, '20, p. 402) in *Capital and Ideology*, "Religion has always been -and still is -an advocate for the sanctity of private property.") **John Witherspoon**, a famous preacher, railed against "rebels with socialist tendencies."

Electoral College

Hamilton suggested a president and senate chosen for life. **Hamilton** did not get this but he got the next best thing, a president chosen by *electors* who were chosen not by popular vote but by an "Electoral College" who were not elected by popular vote, but were chosen by the state legislatures.

He said the electors would be men most capable. This would ensure that the presidency "would never fall to the lot of any man who is not to an eminent degree endowed with the requisite qualifications." The Electoral College itself was designed to give an advantage to small states.

Different views made policy compromises necessary.

Populous states like Virginia wanted an unicameral legislature based on population. Small states wanted an equal vote for each state. **Madison's** proposed *Constitution* described a republic with limited democratic features, three branches, legislative, executive, and judicial.

The legislative branch to have two co-equal bodies, a House of Representatives chosen by vote of white males who owned property in the legislative district, i.e., "eligible" voters, a co-equal body, a Senate, with two senators from each state regardless of population, not chosen by popular vote, but chosen by

state legislatures. The voters of small states were per capita thus far over-represented in the Senate.

The compromise to get slave owner votes

In the proposed *Constitution*, any act of Congress needed approval of both the House of Representatives and the Senate. Slavery was untouched. It was legal and practiced in most of the 13 states. For census purposes, slaves were counted as 3/5 of a person.

Slave owners argued it was in a slave owner's best interest to treat his slaves well, a disingenuous argument. As slaves didn't vote, voters in states with slaves got more representatives *per capita* of voters vis-a-vis states with few slaves. The greater the proportion of slaves in a state, the greater was Whites' over-representation in the House of Representatives. Massachusetts effectively prohibited any African or Negro to become a permanent resident.

The compromise on voting

The proposed *Constitution* was silent on the prevailing colonial voting laws which limited voters to a tiny portion, about 5-8%, of the population. That is, no women, Blacks, indentured servants, or even free white men without property. Blacks were assumed to be an inferior race. Most of the deputies/signers owned slaves. They were among the colonies' elite, rich and well born. The proposed *Constitution* referred to the president, senators, and representatives all as male.

Mr. Gerry's Objections

Jefferson, Samuel Adams, George Mason, Patrick Henry, and Eldridge Gerry, known as Anti-federalists, argued that the deputies had exceeded their authority by replacing the *Articles of Confederation* with a new basic governing document. They correctly said that the deputies represented only the well-born few and so had crafted a document for the propertied class, also that the proposed *Constitution* gave too much power to the central government at the expense of the states. Paine's *Common Sense* had appealed to the Common man. The *Constitution* appealed to male property owners.

The Anti Federalists most serious criticism was that the *Constitution* had no *Bill of Rights*. They wanted specific guarantees of various rights. Their arguments were described in the *Hon. Mr. Gerry's Objections*.

Mason's Bill of Rights was considered and rejected

George Mason proposed a *Bill of Rights* based on his 1776 *Virginia Declaration of Rights*.

His proposed *Bill of Rights* would protect freedom of religion, speech, press, assembly, persons and their possessions against search and seizure, against double jeopardy, the right against self-incrimination, against cruel and unusual punishment or excessive fines, and mandate a speedy and public trial by jury.

Hamilton opposed including a *Bill of Rights* (*Federalist* 84). He prevailed.

The deputies briefly discussed and rejected Mason's Bill of Rights. The *Constitution* was agreed to without a *Bill of Rights*. So George Mason and two other deputies didn't sign it. The *Constitution* was sent to specially convened state *Constitutional Conventions*, not the existing state legislatures, for ratification.

There were around 50,000 slaves and indentured servants in the colonies; mostly white.

1787 Federalist Papers

Ratification was not certain. New York governor **George Clinton** led the opposition to ratification.

To promote ratification, particularly by New Yorkers, during the winter of 1787-88, **Hamilton**, **Madison**, and **John Jay**, Federalists, wrote 85 articles and essays advocating ratification, which when collected were *The Federalist Papers*. **Hamilton** wrote at least 50 of the papers. (**Madison** wrote in his notebook, "Where slavery exists, the republican theory becomes fallacious.")

Men aren't reasonable

Federalist 15 said, "Why was government instituted at all? Because "the passions of men will not conform to the dictates of reason and justice without constraint." The "reason" and "justice" involved were, of course, of those who wrote *The Federalist papers*, **Hamilton**, **Madison**, and **Jay**.

1788 Madison said, "It's a republic, not a democracy"

Federalist No. 10 is regarded as the most important paper. In it, **Madison** said the new government would be a republic, not a democracy. It was directed to the White propertied literate male voters.

He described some "constraints" on the powers of the common people that he designed explicitly to prevent a democratic rule by a majority of the people, namely:

1. a president picked not by popular vote, but by "electors" in an "Electoral College"
2. whose "electors" were not picked by popular vote but by state legislators,
3. a legislative House of Representatives chosen by voting laws written by state legislatures, and
4. a co-equal legislative body, the Senate, also picked not by popular vote but by state legislators.

Federalist No. 54: The proposed *Constitution* "decides with great propriety on the case of our slaves, when it views them in the mixed character of persons and of property. This is in fact their true character." To counter governor **Clinton** of New York, starting in January 1788,

the *Federalist Papers* were serialized anonymously in four New York newspapers.

**Hamilton
denigrated
democracy
1788**

In June, **Hamilton** spoke urging ratification. Some say “a pure democracy if it were practicable would be the most perfect government. Experience has proved that no position is more false. The ancient democracies in which the people themselves deliberated never possessed one good feature of government. Their very character was tyranny ” He also opposed any *Bill of Rights*.

**Washington:
not perfect
but the best
we could get.**

Washington: “I wish the *Constitution* offered, had been made more perfect, but I sincerely believe it is the best which could be obtainable . . . And as [it can be amended, its adoption] is desirable.”
The *Constitution* nowhere used the words “Christian,” “**Jesus**,” or “God.” It used deist words. The Federalists won; the New York convention narrowly (3 votes) voted to ratify.

**Comments
on the
Constitution**

Political Theory: Historian **Richard B Morris** says that *the Federalist* essays are a classic in political science unsurpassed in both breadth and depth by . . . any later American writing.”

A historian of the *Constitution*, **Charles Beard** in 1913 wrote, “The propertyless masses, under the then suffrage qualifications, were excluded at the outset from participation.” He critically analyzed the financial interests of the writers of the *Constitution*. (See 1913-**Beard**)
The Federalist Papers remains the principal source for the actions of the founders.

**1788
Oxygen is
an element,
with atomic
weight of 8.
Symbol O**

Chemistry: Lavoisier (ref.1775, '83), said air was made of two different gasses. (He was 99% right. Air is c.78% nitrogen (inert), c.21% oxygen, plus tiny amounts of Argon (inert), and CO₂.)

Oxygen is an element, atomic weight 8. Symbol “O”. Oxygen gas, O₂, is normally two oxygen atoms joined, not one atom of oxygen by itself. O reacts easily with many other elements.

Lavoisier proved by experiment that rusted iron is heavier than pure iron as iron “Fe” chemically combines with oxygen “O” and picks up the weight of the oxygen to become iron oxide, rust. The proportions of the elements in a molecule of iron oxide is 3 atoms of iron & 2 atoms of oxygen, Fe₃O₂. Combining anything with oxygen is *oxidation*, a leaf burning, iron rusting, paper yellowing with age.

**Law of
Conservation
of Mass**

So, in a closed container of iron and air, when iron rusts, the total weight of the rusted iron and the remaining air in the container remains the same. **Lavoisier** used precise balance scales in his experiments. He thus is credited with the Law of Conservation of Mass, one of the great discoveries of the 18th century. [In the 20th century, when **Einstein** showed the equivalency of mass and energy, it was superceded by the law of *Conservation of mass-energy*, but is still valid in a closed system]. Despite his work on oxidation, he was not the first to say oxidation was the primary thermal source of energy for any living cell. (In 1841, **Julius Mayer** was.)

**1788
Theory of
the Earth**

Geology: James Hutton (1726-95), Scot, a doctor, friend of **Hume**, in 1785 had given the *Royal Society of Edinburgh* a scholarly paper, *Theory of the Earth*, on his geological studies. It was published. Said that the Earth was far older than currently thought; clamshells

1788 found on mountains as mountains were formed by the thermal energy from a hot core of the Earth pushing land up. Mountains eroded, left sediments. The book was difficult to read.

**Earth
evolved.**

Regarding the age of the Earth, he said, “We find no vestige of a beginning, no prospect of an end.” He originated the fundamental principle on which geology is based, uniformitarianism,

**Geology
became
a science**

that is, rocks, are modified over eons by natural processes. He said the present is key to the past. That is, the past should be interpreted as far as possible in the light of the present.
In terms of geology, recorded history is only yesterday.

He expanded his views in 1795. His theories weren't widely accepted for decades.

**1788
Kant's
Categorical
Imperative
His central
concept of
his moral
philosophy**

Philosophy: Kant's Kritik der Praktischen Verunft / Critique of Practical Reason said that humans have an innate awareness of moral law as there is but one *Categorical Imperative* (i.e., a command applicable at all times), i.e., “Act only according to that maxim whereby you can at the same time will that it should be universal law.” (Treat others like you would want everyone to act, a slight modification of the *Golden Rule*).

This was, his *Argument from Morality* for God. (*Arguments from Morality* say because moral norms exist, their most likely (or only possible) source is God, so God exists.)

1789 *Critique of Practical Reason* is a defense of practical reason as being capable of grounding behavior superior to that grounded by desire-based reasoning. It is actually a critique, then, of the pretensions of applied practical reason. Pure practical reason must not be restrained, but cultivated.

Laws should codify moral duty	So, <u>laws should codify moral duty</u> . In practice, only the most basic and general moral rules are universal; like, "Don't kill innocents, don't steal." Such basic moral rules of conduct would always arise in any culture, as they help that culture survive.
The Bible commands some very harsh actions	Many moral rules are specific to one or a few cultures and differ from culture to culture, and reflect their culture. For example, <u>few Christians today accept the Bible's commands to kill unruly children, homosexuals, and adulterers, or to accept slavery, or to treat women as property.</u> Kant said that Man's "rational nature," our ability to set ends, makes every human life of highest value, and provides the basis of all value in the world.
Kant: Leibniz's theologies fail	Kant said <u>all justifications for evil, i.e., Leibniz's theodicies, must fail</u> . "Evil is a personal challenge for every one to be overcome by faith." Kant's <i>Conflict of the Faculties</i> , described contradictions between the <i>Bible</i> and reason. He said, "If we are not free to choose, then it would make no sense to say we ought to choose the path to righteousness."
Elementary Treatise on Chemistry	Chemistry: Lavoisier published <i>Traité élémentaire de chimie</i> / <i>Elementary Treatise of Chemistry</i> , the synthesis of his contribution to chemistry and the <u>first modern textbook on chemistry</u> . The core of his work was the oxygen theory, and it became a most effective vehicle for the transmission of the new chemical doctrines. It presented a unified view of new theories of chemistry.,
1789 Lavoisier	<i>The Law of Conservation of Mass: Traité</i> contained a clear statement of the law of conservation of mass. <u>The total mass of chemicals being combined (reactants) equals the total mass of the products of the combination of all its elements</u> .
The Law of Conservation of Mass	He had done numerous chemical reactions and precisely weighed the results before and after. He clarified the definition of an <u>element as a substance that could not be broken down by any known method of chemical analysis</u> and presented his theory of the formation of chemical compounds from elements. He said <u>an element was the last point a chemical analysis can reach</u> . He made the first good list of elements, 33 of them. Gold and copper were correctly considered to be elements, but some <i>combinations</i> of elements were incorrectly considered to be elements.
Principle of Indestructibility	<u>The principle of indestructibility of atoms explains why all matter obeys this conservation of mass law. Only a rearrangement of atoms in various combinations takes place during a chemical change and, therefore, the total mass of the material remains unchanged.</u> <u>Matter cannot be created or destroyed. This law makes possible writing chemical changes as balanced equations</u> Don't confuse mass with volume. The resulting <i>volume</i> of a chemical combination could be more or less depending on the chemical combination (s) involved.
1789	Lavoisier showed that every chemical operation ends in an equation where, <u>while the materials may be altered, the weight of the total amount stays the same</u> . He used a precise balance scale in his experiments. <i>Traite élémentaire de chimie</i> had three parts. 1. The formation and properties of gasses, oxidation, fermentation, and the composition of air, water, acids, bases, and salt. 2. 33 substances he thought to be elements. 3. The apparatuses and methods he used, with many detailed illustrations by Marie-Anne . Another significant scientific milestone he discovered was that <i>burning</i> was simply combining with oxygen. <u>Thus did Lavoisier kill the mythical phlogiston</u> . <i>Traite</i> was soon translated into English. It is a classic in the history of science. (See 1792 for next chemistry entry.)
1789	Political Theory, ratifying the <i>Constitution</i> : By 1789, all states but Rhode Island ratified the proposed <i>Constitution</i> by state conventions. Rhode Island had a popular vote and voted not to ratify. <u>So the Constitution was ratified by the other states. The new Congress was established.</u>
Constitution was ratified	Political Theory, democracy: <u>The Constitution condoned slavery</u> and said nothing about the rights of women, indentured servants, or Indians that state laws that favored the rich. Women could not vote, inherit, sue, sit on juries, make a will, hold public office, keep their children in a divorce, or own property. If they had a job, their wages went to their husband. In other words, by law, the slave of their husband. Like Muslim men, American men feared that women were as worthy as themselves.. Did the framers of the <i>Constitution</i> intend to subjugate women, Blacks, Indians, indentured persons, and people without property? Of course. They protected their class and their
Constitution was silent on big issues: Women and slaves were property	

domination of women.. Recall **Abigail Adams** wrote her husband, **John Adams**, “In the new code of laws which I suppose it will be necessary for you to make, “I desire you to remember the ladies and be more generous. . . to them than your ancestors. Remember, all men would be tyrant if they could.”

The United States of America

So, America began as a republic with no *bill of rights*, no state religion, no nobility or king, with separate executive, legislative, and judicial powers, and unified by a common language and by the war against England. It continued to protect propertied white males from the majority of the population at the ballot box, with an indirect election for the Senate, one of its legislative bodies and a double indirect vote for the presidency.

Today, 125 countries have a popular vote for their president, not the US. (**Ambrose Bierce**: “Republic, a form of government in which equal justice is administered to all who can afford to pay for it.”) The *Declaration of Independence* was far more “democratic” than the *Constitution*.

Voting qualifications were left to the states. So only white male property owners could vote, perhaps 5-8% of the population. In elections for Congress, due to the silent Constitution and state laws the vast majority of the population were not allowed to vote, namely: women, free Blacks, slaves, tenant farmers, Indians, persons who didn't own property, and indentured servants. So in New York, 3% of the population could vote, Georgia 5%, Delaware 3%, Rhode Island under 1%

Some states had ratified it on condition that a *Bill of Rights* be adopted. So **Madison** proposed 15 “rights” based largely on **George Mason's** previously rejected *Bill of Rights*. Congress approved ten of **Madison's** 15 proposed “rights”. They were sent to the states for ratification. (ratified in 1791.)

Jefferson Quotes:

Political Theory, religion: **Jefferson**, “Question with boldness even the existence of God; because if there be one, he must more approve of the homage of reason than that of blindfolded fear.”

Christianity has made half the world fools, and the other half hypocrites.

“The legitimate powers of government extend to such acts only as are injurious to others. But it does me no injury for my neighbor to say there are twenty gods, or no god. It neither picks my pocket nor breaks my leg. Difference of opinion is advantageous in religion. The several sects perform the office of a *Censor morum* over each other. Is uniformity among religions attainable?

Free enquiry must be allowed

Millions of innocent men, women, and children since the introduction of Christianity, have been burnt, tortured, fined, imprisoned; yet we have not advanced one inch towards uniformity. What has been the effect of coercion? To make one-half of the world fools and the other half hypocrites.

That if there be but one right, and ours that one, we should wish to see the 999 wandering sects gathered into the fold of truth. But against such a majority we cannot effect this by force.

1789

Reason and persuasion are the only practicable instruments. To make way for these, free enquiry must be allowed . . . Ridicule is the only weapon which can be used against unintelligible propositions. “Ideas must be distinct before reason can act upon them; and no one ever had a distinct idea of the trinity. It is the mere Abracadabra of the mountebanks calling themselves the priests of Jesus.”

Thomas Jefferson Quotes

Political Theory: Inscribed in the **Jefferson** Memorial in Washington DC is, “I have sworn upon the altar of God, eternal hostility against every form of tyranny over the mind of Man.” It is seen as referring to religions. He also said, “There is a natural aristocracy among men. The grounds of this are virtue and talent. There is also an artificial aristocracy founded on wealth and birth. The artificial aristocracy is a mischievous impediment in government.”

Benjamin Franklin Quotes

Benjamin Franklin, as the first US ambassador to France, exemplified the emerging American nation. Said, “The way to see by Faith is to shut the eye of Reason.” “I have found Christian dogma unintelligible. Early in life, I absented myself from Christian assemblies.”

Christian dogma is unintelligible

“Lighthouses are more helpful than churches.” “Most fools think they are only ignorant.”

He also debunked phrenology, said, “The primitive Christians thought persecution extremely wrong in the pagans, but practiced it on one another. The first Protestants of the Church of England blamed persecution on the Romish Church, but practiced it upon the Puritans.”

George Washington: Our government is not based on Christianity.

Washington used principally *deist*, not biblical, references to a supreme being in his writings. He spoke of the “grand architect, Nature's God, creator, supreme architect.” He signed the *Treaty of Tripoli* which stated, “The government of the United States is not in any sense founded on the Christian religion.” The treaty was ratified by Congress in 1797 under President **John Adams**, a *deist*. **Adams** added that he accepted, rarified and confirmed every clause and article. The statements of **Jefferson**, **Madison** (ref 1784), and **Franklin** are also *deist* statements.

The best world has no religion. **John Adams** wrote, “The divinity of Jesus is a convenient cover for absurdity.” And, in 1816, “This would be the best of all possible worlds, if there were no religion in it.” Also, “Absolute power intoxicates those who have it. (See 1887-**Acton** and “Power corrupts” in the Index).

Native Americans Presidents **Washington, Jefferson, John Quincy Adams, Jackson, Harrison**, Chief Justice **John Marshall, Ben Franklin**, and most Americans all favored exterminating Indians. Treatment of Indians was worse than that of Blacks. By 1700, 90% of the American Indians were dead.

1789 **France** France: From 1650-1789, France, the richest Western country, was an absolute monarchy based on the “*Great Chain of Being*” (**Plato**) from the poorest (most everyone), up to nobility, to king and God. The *Enlightenment* had discredited the authority of the king and the Catholic Church.

France was ripe for a revolution. France was unstable: **Jeremy Popkin**, American historian, described France before its revolution, “France was insolvent: it had defaulted on its sovereign debt. . . Its support for the American rebels had badly strained its finances, and it never recovered. There was a general sense of injustice.” “Taxes were forever rising without anything to show for them.

Clergy and nobility paid no taxes. Taxes were regressive, the less wealthy and poor workers, farmers, and merchants. . [paid all the taxes.] Clergy and nobility paid no taxes. . . Classes were rigid. if one was born into the lower ranks, that was where one stayed regardless of ability. (Like the Hindu Caste System) Conversely, incompetent nobles still ruled, a source of bitter resentment to those aspiring to improve themselves. Much of the population was hungry.”

Incompetent nobility ruled

King Louis 16 was incompetent. He had imposed new taxes (on the poor). Bread prices were going up. Feudalism had been weakened and had disappeared in parts of Europe. Many peasants owned land, and had attained an improved standard of living and education. and wanted social recognition and political and legal power for their economic enterprises.

France's economy was stagnating and economic crises, provoking alarm and even revolts became frequent. Arguments for social reform were advanced publicly. The *philosophes* were influenced by **Voltaire, Montesquieu, Diderot, Rousseau, Descartes, Spinoza, Locke**, and the American revolutionaries. Some Frenchmen had read **Locke, Bentham, Rousseau**, and **Jefferson** and had seen the Americans kick out nobility and a state religion. Some of course had fought to help America gain independence.

1784 **Rousseau's** (ref. 1761) *Confessions*, was widely read, honest. How he rejected conventional society in favor of nature and natural man was one of the seminal works of the Romantic Movement in France..

1789 **Robespierre** The French Revolution, Maximilian Francois Marie Isidore de Robespierre: (1758-94). On July 14, Mobs collected around the Bastille (a symbol of the monarchy), where seven prisoners and gunpowder and weapons were stored. Revolutionaries stormed the Bastille. They swarmed in and overpowered the guards, losing 96 men, freeing seven prisoners.

After the Bastille attack, **Lafayette** was appointed commander-in-chief of France's National Guard to counter the rebels. He tried to steer a middle course through the years of revolution. (In August 1792, rebels ordered his arrest. He fled to the Austrian-governed Netherlands.)

Declaration of Rights of Man In August, Jacobins under Robespierre issued a “Declaration of the Rights of Man and of the Citizen. Paine was the chief if not the sole author.” Its preamble resembled the *US Declaration Independence*. Its goals were Platonic, the peaceful enjoyment of liberty and equality, the reign of eternal justice. Feudalism and the old rules and privileges left over from the *Ancien Regime* were abolished. **Jefferson**, then U.S. Minister to France, helped **Lafayette**.

The Jacobin Declaration went much further toward democracy than the American Bill of Rights then being ratified. It abolished slavery and special privileges for clergy, promoted freedom of speech, the press, religion, and trade, guaranteed care for the poor and aged, emancipated the Jews, said that the source of all sovereignty was the nation. _

This was risky as it permitted a tyrant to claim he was acting for the state.

Robespierre did just that. He decreed death to “enemies of the revolution.”

The National Assembly abolished hereditary nobility and titles and strictly limited the king's power and all privileges of an economic nature were abolished. .

The Turning point in European history <i>Liberte, Egalite, et Fraternite</i>	The National Assembly confiscated all Church property. It voted to do away with religious orders. <u>The French Revolution was the turning point in European history, much more important worldwide in changing history than the American Revolution.</u> It destroyed the old order. Its motto was <i>Liberte, Egalite, et Fraternite</i>. (suggested by Franklin). It put fear in “nobles” across Europe. It inspired revolutions worldwide. <u>The American and French revolutions were the first to be expressed in secular, not religious, terms.</u> A strong strain of liberal Christian thinking, like Methodism, even in Catholicism, developed and strict Puritanism faded. Will Durant: Revolutions do more to destroy wealth than to redistribute it. (more French Revolution at 1793)
1790 <i>Reflections on the Revolution in France.</i> A democracy is shameless and fearless.	<u>Political Theory, conservatism</u>: Burke (ref. 1756, '75), England's foremost statesman, was appalled. He wrote <i>Reflections on the Revolution in France</i>, the founding text of modern conservatism, (with a paean to “the fragrance and charisma of Marie Antoinette).” He denounced the revolution. He argued <u>against natural rights</u>, said all rights come from the history of the society. He condemned <i>the Enlightenment</i>. Burke was not optimistic regarding human nature. He said, “<u>Government is a contrivance of human wisdom to provide for human wants.</u> Men have a right that these wants should be provided for. . . A perfect democracy is the most shameless thing. And as it is the most shameless, it is the most fearless..All useful and legitimate innovations must result from the slow growth of the collective mind in accordance with tradition.”
Edmund Burke Quotes. Superstition is the religion of feeble minds	<u>Conservatism</u>: “An aristocracy and a despotism differ little but in name. Superstition is the religion of feeble minds.” “Show me an absurdity in religion and I will show you a hundred in political laws and institutions.” <u>The only infallible criterion of wisdom to vulgar minds is success.</u> “<u>The French are not fit for liberty</u> and must have a strong hand like that of their former masters to coerce them. . . the revolutionaries had “pulled down. . .their monarchy, church, nobility, law, revenue, army, navy, commerce, arts, manufactures. . .People never give up their liberties but under some delusion.” [The French Revolution was] “irrational, unprincipled..confiscating, plundering, ferocious, bloody, tyrannical democracy.” “Religion is the basis of civil society and the source of all good and all comfort. What is liberty without wisdom, without virtue? <u>I love a manly, moral, regulated liberty.</u>”
Father of modern conservatism	Burke is the authentic “conservative.” His writings became the basic conservative critique of attempts to reform society toward a more equal society based on abstract theories. Such classic conservatism is a philosophy of governing, be cautious, respect tradition. His conservatism was basically pessimistic. “Time is the great instructor.” He distrusted ideology. The European monarchies, except France, did not develop the feelings for democracy that Americans did.
Burke: Woman is an animal not of the highest order	Burke had agreed with the English Revolution of 1688 as it protected the national traditions of Protestantism. The prevailing British system whose “tradition” Burke wanted to respect was the aristocratic caste system. Like Locke, He opposed letting the poor vote. Burke warned <u>England not to imitate France, lest confiscation and plunder of property result and atheism replace religion.</u> He termed the French revolution a threat to Europe and all people. He wrote, A woman is but an animal, and an animal not of the highest order.” Mary Wollstonecraft replied in 1792.
1790	<u>Philosophy</u>: Kant wrote <i>Kritik der Urtheilskraft / Critique of Judgment</i>. It defined the pleasure one gets from art as “disinterested satisfaction.” He saw art as uniting the opposite principles of reason and imagination. <u>Concepts like God and Soul can never be proven.</u> Said, “Reason utterly condemns war, which only an international government can prevent.”
Goethe, master spirit of the German Volk <i>Legend of Faust</i>	<u>Philosophy</u>: Johann Wolfgang von Goethe (1749-1832), the master spirit of the German people, leading figure of his age after Napoleon. Scientist, novelist, philosopher, critic, poet. He was a humanist, disdained religion. He wrote <i>The Legend of Faust, Part One</i> (make a pact with the Devil). The <i>concept</i> is as old as the legend of <i>Don Juan</i>. (Marlowe wrote of it in 1584.) <i>Part One</i> deals with the destruction of the <i>Medieval</i> world and its replacement by modern society, i.e., Faust falls in love with Gretchen and takes her out of a <i>Medieval</i> town but abandons her. It describes a new world is being born. (Next Goethe 1810 and 1832 for <i>Part Two</i>)
Make pact with	Charles Van Doren explained <i>Part One</i>: “For nearly two millennia, Christians had believed that true freedom came from God. Dante had proclaimed, “His will is our peace,” and a

the Devil thousand sermons had promised their listeners that if they would only obey God's commands, they would attain eternal bliss. But, the deal with God had not worked. A new deal was needed. The only alternative was to deal with the Devil."

1790 **Franklin's Auto-biography** **America: Benjamin Franklin** (ref. 1751-2, '73-79, '89) died. His *Autobiography*, published a year later listed 13 virtues and guiding precepts, **1** Temperance, **2** Silence, **3** Order, **4** Resolution, **5** Waste nothing, **6** Industry, **7** Sincerity, **8** Justice, **9** Moderation, **10** Cleanliness, **11** Tranquility, **12** Chastity, and **13** Humility. He helped define the American ethos extolling the values of thrift, hard work, education, community spirit, and opposition to authoritarianism both political and religious, **Jacques Turgot** praised him, "He snatched the lightning from heaven, and the sceptre from tyrants."

Walter Isaacson said he was "the most accomplished American of his age and the most influential in inventing the type of society America would become.

1790 White Supremacy: The US Naturalization Act limited citizenship to "white persons."

1791 **Kant: All theodicies fail.** Theodicies: **Kant** (ref.1755, 81, 85, 87-90) defined **Leibniz's theodicy** as "the defense of the highest wisdom of the creator against the charge that reason brings against it for whatever is counter-purposive in the world." He addressed the *Problem of Evil* in an essay, "*On the Miscarriage of All Philosophical Trials in Theodicy*." In it, he says "Theodicies have 3 approaches: 1. It can argue that what mankind considers to be "evil" is not, in fact, evil. 2, it can excuse God, as evil could not be prevented due to the requirements inherent in creating beings like man, and 3. One can say that evil was not caused by Him." **Kant** concluded that all theodicies fail to conclusively answer the problem due to the limitations of finite human reasoning.

(More **Kant** 1795, '95, '97, 1821, '44, '62, '81, '86, 1914, '16, '20)

1791 13 years after he died, **Voltaire's** remains were dug up and tens of thousands of persons marched to Paris to bury him in the Pantheon.

In England, a crime to own a copy of Paine's The Rights of Man. Political Theory, Parliament's abject fear of democracy: **Thomas Paine** responded to **Burke's** attack on the French Revolution with *The Rights of Man*. It described human rights in detail, against monarchism and hereditary succession. It said that **Burke** "pities the plumage but forgets the dying bird. It was the severest indictment of hereditary monarchy and nobility ever printed. Parliament made it a crime to own it, and indicted him for treason.

Thousands of poor pooled their pennies and bought copies. It became an underground manifesto, passed from hand to hand. "He fled to France. He was elected to the French National Assembly When Brits were tried for treason, the prosecution always showed that the accused owned a copy. (Next **Paine** 1794)

US Bill of Rights ratified America: For more than two years from the start of the American war, a longer period in several states, there was no established form of government. . . yet during this interval order and harmony were preserved as inviolate as any country in Europe. In Philadelphia, most of **Madison / Mason's "rights"** were ratified as the first ten *Amendments* to the *Constitution*.

The *First Amendment* (based on the 1785 *Virginia Statute for Religious Freedom*) protected speech and the right to assemble. It required the federal government to tolerate and stay out of religion, but had no ban on church political action. This amendment repudiated England's endorsing Anglicism and was meant to reduce the power of the religions of the various states as 11 of the first 13 states had a religious test to hold public office. Nine states subsidized their official churches.

US Bill of Rights While the *First Amendment* protected free speech, in just a few years, Congress passed the anti-democratic *Alien and Sedition Acts* of 1797-98. The *Alien and Sedition Act* called for deportation of people from 'hostile' nations and made it a crime to criticize the government.

It was largely repealed by the next Congress. The *Sedition Act*. Under English Common Law, 'seditious libel' was any criticism of government officials in a way that undermined their authority or affected their reputation, "**Hamilton** wanted most aliens to be deported, a huge proportion of the population. The *Second Amendment* was short. "A well regulated militia, being necessary to the security of a free state, the right of the people to keep and bear arms, shall not be infringed." This showed an apparent constitutional rationale to permit people to own a gun.

Rights give the law Political Theory: **Ronald Dworkin** (1931-2013) American, professor of law and philosophy, "Rights are fundamental and give the law its moral framework. Rights don't just limit majority, i. e.,

its moral framework	democratic authority, they also explain where democratic authority comes from.” Due to the <i>Enlightenment</i> , America was the first nation to explicitly exclude religion as one of its basic principles.
1792	Jefferson wrote to a slave-born inventor, “Nature has given our black brethren talents equal to those of the other colours of men.” He also favored the gradual emancipation of Blacks and their return to Africa. (In 1821, <i>The American Colonization Society</i> helped found Liberia.)
Madison: Property is all that a man owns and values	<u>Political Theory, property</u> : James Madison proposed to resolve the “property” vs. “pursuit-of-happiness” dichotomy in the <i>Declaration of Independence</i> by <u>defining property as all that a man owns and values</u> , i.e., <u>his property, his opinions, his religious beliefs, and his security</u> . This concept is radically revolutionary, i.e., that the government must respect the rights of property and the property in one’s rights. It is not possible to go beyond this. The most common and durable source of faction has been the various and unequal distribution of property .
Adams worshiped property	Like Locke , John Adams venerated <u>private property</u> , “The moment the idea is admitted into society that property is not as sacred as the laws of God. . . anarchy and tyranny commence.” (Paine’s 1797 <i>Agrarian Justice</i> separated property as the bounty of nature, like land belonging to all, and one’s property created by the fruits of one’s labor.)
1792	<u>Political Theory, France</u> : Bertrand Barere , speaking to the French <i>Convention Nationale</i> . “The tree of liberty only grows when watered by the blood of tyrants.” (Ref. 1787- Jefferson)
1792	<u>Slavery</u> : John Hancock , governor of Mass., signed an order providing a pension for Anthony Vassall , who had sued for compensation for being a slave. Slavery was still legal in Mass.
1792	<u>Physics</u> : Pierre Prevost (1751-1839), Swiss, showed that all bodies, hot or cold, radiate heat
1792 Laws of Chemistry	<u>When elements combine: <i>The Law of Definite Proportions</i></u> : Chemists Jeremais Richter (1762-1807) German, in 1792, and Joseph Proust (1754-1826) French, in 1794 discovered that the weights of two or more different elements which combine into a compound will always be will be the same as (or simple multiples of) the proportions of the weights of these different elements. In simple terms, it means that irrespective of its source, origin or its quantity, the percent composition of elements by weight in a given compound will always remain the same. Richter called this <u><i>Stoichiometry</i></u> . According to atomic theory, a particular compound is the combination of a definite number of atoms of the different elements. As every atom has a particular weight, the relative weight of each component in the compound must always be the same and, so, in every particular compound, the elements are always in the same proportion by weight.
Evidence that atoms exist	This Richter-Proust Law , called <i>Stoichiometry</i> or <i>Definite Proportions</i> , does not prove that atoms exist, but is difficult to explain without saying that chemical compounds are formed when <i>atoms</i> combine in constant/same proportions. <u>Illustration</u> : Definite weights of certain acids neutralize (by combining with) definite weights of certain bases, and vice versa.
1792-1811 Five main Laws of chemicals combining	<u>How Chemicals Combine</u> . Chemical combinations occur when atoms of one element combine with atoms of another element to create a new substance called a molecule). Such combining is called a chemical bond. Five basic laws (and a few subsidiary laws) govern how chemicals combine.: 1. <i>The Law of Conservation of Mass</i> , (ref. 1756, ‘66, ‘75, 88-9- Lavoisier) 2. <i>Law of Definite Proportions</i> (Richter and Proust (1792), 3. <i>Law of Multiple Proportions</i> , Dalton , (see 1803) 4. Gay Lussac’s Law of Gaseous Volumes (see 1808), 5. Avogadro’s Law of gaseous volume (see 1811).
Women’s Rights	<u>Male supremacy</u> : In all societies, women could not vote. They were their husband’s property, they could not sell their property, Her husband could beat her, she had no parental rights. Even men considered enlightened were at best condescending to them. Recall, Rousseau (ref. 1761) had said women’s job was to serve and console men. Jefferson similarly commended women “who have the good sense to value domestic happiness above all other and who are “too wise to wrinkle their foreheads with politics.”

Samuel Johnson said even portrait painting or writing were unsuitable for women. The *Constitution* ignored them. Worldwide governments were no better. Muslim countries were worse.

Women's rights Into this male world burst **Olympe de Gouges** (1748-93), French, and **Mary Wollstonecraft**. **Gouges** said, "I wish to see women neither heroines nor brutes but reasonable creatures." She wrote *Declaration of the Rights of Women and the Citizen*.

"Women may mount the scaffold. They should also be able to ascend the bench." She argued that whatever the *Universal Declaration of the Rights of Man* said about men must also apply to women. So the Jacobins cut her head off.

1792 **Wollstonecraft** (1759-97), Brit. similarly answered **Burke** (1790) in *Vindication of the Rights of Women*, First great treatise of feminism. "The *Enlightenment's* chauvinism is hypocritical."

She wrote **Burke**, "I smother the contempt I feel rising for your rhetorical flourishes and infantile sensibilities." "I wish to persuade women to endeavor to acquire strength, both of mind and body. . . I wish to show that the first object of laudable ambition is to obtain a character as a human being, regardless of the distinction of sex."

She said, "The mind has no gender. . . Civilization is an extrapolation of male physical strength over women." Her book created a sensation. It shocked and scandalized society.

Horace Walpole, Brit, art historian, Whig politician, fool, called her a hyena in petticoats.

Her book was reprinted in America. Translations were soon made in French and German. She married anacharist **William Goodwin** (just below) and associated with radical thinkers including **Thomas Paine**. (She died giving birth at 38.) Both **Gouge's** and **Wollstonecraft's** books aided women's fight to be free of medieval servitude. (See 1893 for when women could vote).

Anarchism 1793 Political Theory, anarchy: **William Godwin** (1756-1836) Brit, social critic, proposed to abolish all laws as they derived from ancient compromises which progress of humans had made obsolete. (The word *anarchism* did not then exist.) He wrote *An Enquiry Concerning the Principles of Political Justice and Its Influence on General Virtue and Happiness*. It was the longest and most systematic defense of anarchism by a Brit. He indicted all government.

Godwin Quotes **Godwin** wrote, "The history of mankind is little else than the history of crimes" with war, inequality, and despotism the dominant characteristics. . . Government can have no more than two legitimate purposes- suppression of injustices against individuals in the community, and the common defense against external invasion. "Governments have bred disastrous wars, usually for trivial reasons, killing millions for matters of no personal concern to them." He felt even the best government was evil as it interfered with the activities of reason and hindered intellectual progress.

1793 The French Revolution: The *Jacobins* during their 1793-94 "*Reign of Terror*" guillotined **Louis 16** and an estimated 20-40,000 more, mainly noblemen and clergy, and then even **Robespierre**.

Reign of Terror In August 1793, all the French academic societies, including the Academy were suppressed in the reign of terror. The *Jacobins* even briefly imprisoned **Thomas Paine**, then living in France and a member of the National Convention of 1792, for speaking against the execution of **Louis 16**. In 1794, Lavoisier and 27 officers of his tax-collecting company, Farmers-General, were guillotined. He asked for two weeks reprieve of his execution to finish his last experiment. He was told, "The Republic has no need of learned men."

Lavoisier fit all chemical experiments into the framework of a single theory. He developed a new system of chemical nomenclature

He made chemistry as important as physics

Overall, his contributions are considered the most important in advancing chemistry to the level reached in physics and mathematics during the 18th century.

Joseph-Louis, Comte de Lagrange, a prominent French astronomer said, "It took them only an instant to cut off this head, and a hundred years might not suffice to reproduce its like."

Lavoisier's fundamental contributions to chemistry was to fit all experiments into a single theory. He established the consistent use of the chemical balance. He developed a new system of chemical nomenclature which held that oxygen was an essential constituent of all acids (which later turned out to be erroneous).

Robespierre's execution ended the revolution's most radical phase. The National Convention freed all slaves in all French colonies. The French Revolution was led by a mob, not by rich men like America. It put Europe in turmoil for 25 years. It ended *the Enlightenment*.

Napoleon Napoleon: Nobles throughout Europe resisted the French revolution. The ruling revolutionaries put **Napoleon Bonaparte** (1769-1821), a young Corsican army officer, in charge of the army to

Bonaparte restrain the unruly masses. He restored order and mobilized the country on a scale never seen.

1794-96
The Age of Reason; Being an Investigation of True and Fabulous Theology

Philosophy: Thomas Paine's *The Age of Reason; Being an Investigation of True and Fabulous Theology*, argued for deism. "All national institutions of churches, Jewish, Christian or Turkish, appear to me no other than human inventions, set up to terrify and enslave mankind, and monopolize power and profit."

It was published in three parts in 1794, 1795, and 1807. It was a best-seller in the U S, where it caused a short-lived deistic revival. Its deistic arguments; for example, highlighted the corruption of the Christian Church and criticized its efforts to acquire political power.

Paine advocated reason, not revelation, rejecting miracles and viewing the *Bible* as ordinary literature, not divinely inspired. His book promoted natural religion and a creator-god, deism.

Brits' fear of democracy: Paine's arguments regarding a deity had long been known to the educated elite, but he put them in a popular style. He made deism accessible to the masses.

Originally distributed as unbound pamphlets, the book was cheap and affordable. Fearing the spread of what they viewed as revolutionary ideas, the British prosecuted book-sellers who distributed it. Its English printer was jailed for blasphemy.

1794
Paine's The Age of Reason

Heresy: *Age of Reason* said, "The New Testament teaches us that the Almighty committed debauchery with a woman engaged to be married, and belief in this debauchery is called faith."

All national institutions of churches, Jewish, Christian, or Turkish, appear to me no other than human inventions, set to terrify and enslave mankind and monopolize power and profit."

Paine Quotes

"Whenever we read the obscene stories, the voluptuous debaucheries, the cruel and tortuous executions, the unreasoned vindictiveness with which more than half of the *Bible* is filled, it would be more consistent that we call it the work of a demon than the word of God."

The Bible

It is a history of wickedness that has served to corrupt and brutalize mankind.

The world is my country, all mankind are my brethren, and to do good is my religion."

The Age of Reason inspired and guided freethinkers. (more **Paine** 1795)

1794 **Biology: Erasmus Darwin** (1731-1802), future grandfather of **Charles Darwin**, (see 1831) was an evolutionist. In *Zoonomia*, he argued that all warm blooded animals came from one species and passed along to their offspring traits acquired during their lifetime (**Lamarck's** theory, see 1809)

1794 **Industry: Eli Whitney** (1765-1825), American inventor, patented a cotton gin. In the early 1800s, it exploded the cotton industry and the need for cotton workers. The slave trade from Africa boomed.

1795
Land Reform

Political Theory, land reform: Thomas Spence (ref. 1775), Scot, republished his 1775 penny pamphlet, *Property in Land Every One's Right* under the title *Nationalization of the land*.

Like **Paine**, he spoke of "the rights of man." He wrote it in prison on a charge of high treason. He said, "If we want to get rid of evils amongst men, we must destroy. . . the cause of them, private property in land." In 1797, he wrote *The Rights of Infants*. His ideas were clearly subversive and dangerous to the ruling class in England. After many long imprisonments, he died in poverty at 64.

Condorcet: Tableau Historique des Progres de l'Esprit Humain

Political Theory, democracy: Marie-Jean Antoine-Nicolas de Caritot, Marquis de Condorcet (1743-94) (ref. 1726-29), anti-religious, supported a liberal economy, free and equal public schools, constitutional government, and equal rights for women and people of all races. He was a proponent of and then leader in the first stages of the French Revolution. While in hiding from the radicals of the Jacobin's *Reign of Terror*, **Condorcet** wrote *L'Esquisse d'un Tableau Historique des Progres de l'Esprit Humain* / Sketch for a Historical Picture of the Progress of the Human Mind.

1795
Knowledge leads to a more just world.

Condorcet intended his *Sketch* to be a comprehensive history of the human spirit from primitive times to 1789. It was an extremely influential formulation of the idea of progress.

It made the Idea of progress a central concern of Enlightenment thought.(ref. 1920), He argued that expanding knowledge in the natural and social sciences would lead to an ever more just world of individual freedom, material affluence, and moral compassion.

The book's thesis was that the evils of life came from bad institutions but mankind will eventually free himself from them.

Condorcet was loved by the common people, not by the rich. His ideas, particularly of progress, were influential in future social thinking. Contrary to **Godwin** and like thinkers, he was an optimist.

Dangerous ideas

He also felt that belief in the supernatural had inflicted countless calamities on all people. He felt the advance of medicine and sanitation would abolish diseases, war would be known as a plague and a crime.

These were dangerous ideas. He was arrested and imprisoned by the Jacobins, and in two days was found dead in his cell. *Sketch* was published the next year. **Benedetto Croce** (1920), Italian Minister of Education, called *Sketch* "The last will and testament of the 18th century."

Philosophy: **Paine's Age of Reason, Part Two**, ridiculed absurdities in the *Bible*, became the most popular *deist* book ever written. It gave *deism* an aggressive, anti-Christian tone.

"From whence then could arise the solitary and strange deceit that the Almighty, who had millions of worlds equally dependent on His protection, should quit the care of all the rest and come to die in our world, because, they say, one man and one woman ate an apple?" This is known as the *Small God Problem*, i.e. a God of one small planet and not of the universe.

Original Sin violates every principle of moral justice. Man cannot make natural laws; he can only discover them

Paine's Age of Reason said, "*Original Sin* is contrary to every principle of moral justice." The Reformation "served more than any other event to break the first link in this long chain of despotic ignorance." "All national institutions of churches were "set up to terrify and enslave mankind, and monopolize power and profit." Devout Christians **hated Paine**

- Regarding science, Paine wrote, "It is a fraud of the Christian system to call the sciences a human invention; it is only the application of them that is human. Every science has for its basis a system of principles as fixed and unalterable as those by which the universe is governed. Humans cannot make [natural] principles; he can only discover them."

The Small God Problem

- 1795 Philosophy: Immanuel Kant (ref. 1076, 1686, 1734, '49, '55, '81, '83-85, '87-88, '90-91) wrote *Zum Ewigen Frieden; ein Philosophischer Entwurf / Eternal Peace; a Philosophical Proposal*. Europe was in turmoil, powerful nations disregarded moral rules and treaties. Kant named six conditions to make peace:
1. No peace treaty with hidden clauses that would lead to war.
 2. No independent state can be bought.
 3. Standing armies should disband.
 4. No money shall be borrowed to make war.
 5. No state may interfere by force with the constitution or government of another state.
 6. No state shall do actions that reduce confidence in peaceful actions.

No **Machiavellian** prince would ever agree to these conditions. **Kant** made other suggestions, like to create a federation of free states. He had little influence.

Kant cooled on democracy and called it "the despotism of the majority."

Geology

Geology: Hutton (ref. 1785) firmly said that Earth was at least hundreds of thousands of years old. He expanded his 1785 *Theory of the Earth* into two volumes. Many scientists and others opposed him as he contradicted the current prevailing theory of *catastrophism* (i.e., the theory that repeated catastrophes wiped out groups of animals, and new ones blossomed out afresh).

- 1795-1830 **Ludwig van Beethoven** (1770-1827), born in Bonn, lived largely in Vienna, composed for 43 years, greatest music composer and pianist, became deaf at 47. His works are among the most performed.

Memoir on Living and Fossil Elephants

Paleontology: In 1796, Baron Georges Cuvier (1769-1832), French, was the first paleontologist (the study of fossils). His *Memoir on the Species of Living and Fossil Elephants* saw fossils of extinct animal species at deeper levels than living species. Devout, he accepted *catastrophism*. (See 1795). This melded **Hutton's** findings with the *Bible* and **Plato**. (Current creationists believe in *catastrophism*.)

1796 Anti-Semitism

Political Theory, nationalism: Johann Gottlieb Fichte (1762-1814), German, published *Foundations of Natural Right*. Said self-consciousness was a social phenomenon. Other rational persons are necessary. He hated Jews. Said, "Making Jews free German citizens hurts Germany." (See 1807)

Based on the Bible, Anti-Semitism was deep in German Catholic and Protestant culture.

- 1796 **Napoleon**: became a national hero by defeating Austrian and Italian armies. (Next **Napoleon** 1799),

de Maistre

Monarchy is divinely approved

Political Theory, monarchy: Joseph, Comte de Maistre (1753-1821), Sardinian senator, philosopher, lawyer and diplomat who advocated a social hierarchy said, "The Enlightenment is destroying traditional values . . . Monarchy is divinely sanctioned and the only stable form of government." He said that the rationalists rejection of Christianity caused disorder and bloodshed after the French Revolution. Said, "To admire **Voltaire** means a corrupt heart."

Theory of
Innocu-
lations
One who
gets cowpox
doesn't get
smallpox

Medicine, smallpox: In Europe in the 1700s, 60 million people died of smallpox. (See 1721) Inoculation against smallpox had been used in China and Turkey since at least the 1500s. Doctors including **Edward Jenner** (ref. 1772-75) searched for a vaccine. A milkmaid who had cowpox went to him for treatment. She told **Jenner** that persons who had cowpox did not get smallpox. He injected pus from the milkmaid's cowpox sore into a boy. The boy had a mild reaction. Six weeks later, he injected the boy with smallpox. The boy stayed healthy. He published *An Inquiry into the Variorae Vaccinae, a disease discovered in some of the Western Counties of England*.

This validated the theory that a mild version of a severe disease immunized against a related severe disease. His description of his experiments was widely read and translated into many languages. **Napoleon** inoculated his soldiers and smallpox disappeared.

Christian fear of science: The high Christian clergy's ignorance knew no bounds. They denounced vaccination as interfering with the ways of God.

Anti-vaccination societies were formed. Nonetheless, Parliament praised **Jenner**.

1796 **Math: Carl Frederich Gauss** (1777-1855), German, a math genius. He was the first to prove the quadratic reciprocity law, which let mathematicians determine the solvability of any quadratic equation in modular arithmetic. He posited a prime number theorem, and importantly showed that any regular polygon with a number of sides which is a **Fermat** prime can be constructed with a compass and a straightedge. (more **Gauss** 1799)

Laplace Astronomy, mathematics: **Pierre-Simon, Marquis de Laplace**, (1749-1827) (ref. 1783), probably France's greatest scientist-astronomer-mathematician. He became well known before he was 24 due to his extraordinary mathematical accomplishments, especially his work on the mathematical basis of the stability of the solar system. He became an associate member of the *Academy of Sciences* at 24 and later dominated it.

Exposition
du Systeme
du Monde

In his 1796 book *Exposition du Systeme du Monde*, described his *nebular* hypothesis of the formation of the solar system. The *nebular* hypothesis had been first suggested by **Emanuel Swedenborg** in 1734 and furthered by **Immanuel Kant** in 1755.

Laplace's
hypothesis

Laplace said that our solar system evolved from a globular mass of incandescent gas rotating around an axis through its centre of mass. As it cooled, this mass contracted, and successive rings broke off from its outer edge. These rings in their turn cooled, and finally coalesced into the planets, while the Sun represented the central core which was still left.

His hypothesis now is the generally accepted theory of the origin of planetary systems.

Newton had used geometry to explain planets' orbits and evidence of God. **Laplace** gave a general description of the mechanics of planets' movements but did not give details..

Black
Holes

In the first two editions of his book, he described **Michell's** 1783 idea of "black holes", dark stars with gravitational pulls so strong that even light they might produce could not escape but his later editions did not mention them. Black holes were not at first widely accepted, as the then accepted view was that light had no mass, and thus could not be influenced by gravity.

1796 **Newton** had explained planets' orbits using geometry. **Laplace** extended Newtonian mechanics beyond **Newton's Principia** and used the more modern calculus that he and others had developed. **Laplace** first accepted **Newton's** theory that light was particles and so could be gravitationally attracted, but changed his mind as **Huygens's** wave theory came to be more accepted.

Agrarian
Justice

1797 Philosophy: **Paine's** (ref. 1776, '79, '81, '91, '93-95) *Agrarian Justice*: "It is wrong to say God made rich and poor. He only made male and female; and he gave them the Earth for their inheritance. The Earth was and would . . . ever be the common property of the human race."

He discussed the origins of property and introduced the concept of a guaranteed minimum income through a one-time inheritance tax on landowners. He returned to the US in 1802. His ridicule of religion had made him a pariah to religious persons. Few attended his funeral in 1809.

1797 Political Theory: **Kant**, "The function of the true state is to impose the *minimum* restrictions and safeguard the *maximum* liberties of the people, and never regard a person as a thing."

Essay On
Population

1798 Economics: **Thomas Malthus** (1766-1834), Anglican priest, published, anonymously, *An Essay On the Principle of Population*: Said, "Population when unchecked increases geometrically. And food production only increases arithmetically. (**Malthus** credited **Benjamin Franklin**

for discovering this theory of population growth.) So there is a perpetual struggle for food.

“Famine seems to be the last, the most dreadful resource of nature.”

(**Darwin** read it in 1838 and saw it as a concept crucial to his theory of natural selection.)

Let deformed
and mentally
handicapped
people die, to
mix again
with their
original clay.

Malthus also correctly noted that, “The histories of mankind are histories only of the higher classes.” He thought it was okay that good looking people should prosper while the deformed or mentally handicapped should simply die. He said, “People with mental or physical problems are not suffering and should not be viewed as such. Nothing can appear more consonant with our reason than that those beings which come out of the creative process of the world in lovely and beautiful forms should be crowned with immortality; while those who come out misshapen; those whose minds are not suited to a purer and happier state of existence, should perish and be condemned to mix again with their original clay.”

**Problem of
Suffering**

Malthus answered *The Problem of Suffering* by assuming God existed and argued that God allowed evil/suffering as they spur human creativity and production (presumably those who lived).

**God
punishes
sinners
severely**

He said that the Creator justified suffering and that God should be considered “as pursuing the creatures that had offended him with eternal hate and torture, instead of merely condemning to their original insensibility those beings that, by the operation of general laws, had not been formed with qualities suited to a purer state of happiness.” The God he described was not a loving God.

Clergy and laity vilified him. The wealthy classes supported his ideas.

1798 **Philosophy:** *The Rime of the Ancient Mariner.* **Samuel Taylor Coleridge.** (1772-1834) A significant poem. Its theme was to respect all living creatures and the consequences of not doing so. (See 1831)

**Catholic
Irish
Revolt**

Political Theory, the Irish Rebellion: Emboldened by the Americans and the French, The Irish revolted against British rule. “Oh, Paddy dear! and did you hear the news that's goin' round? The shamrock is forbid by law to grow on Irish ground! No more St. Patrick's day we'll keep; his color can't be seen. For there's a cruel law ag'n the Wearin' o' the Green. I met with Napper Tandy” and he took me by the hand, and he said, “How's poor ould Ireland and how does she stand? She's the most distressful country that ever yet was seen, For they're hanging men and women there for the wearin' o' the Green!” (Anon.)

1798
**England
and Ireland
combine**

England suppressed the revolt in three months. An estimated 30,000 died. Largely in response, the Irish Parliament, i.e., the Protestant propertied class, voted for its own abolition. Thus the phony Irish self-government was abolished. The Irish and the British parliaments enacted the Acts of Union to create a new entity, the United Kingdom of Great Britain and Ireland. The Catholic bishops, who had condemned the rebellion, supported the Union hoping to gain civil rights for Catholics. No luck.

1798 **Physics:** **Cavendish** (ref.1766, '83) calculated Earth's weight from its gravitational effect (off by 1.3%).

**Muslims had
no printing
presses.
Rosetta
Stone**

Muslim neglect of scholarship: When **Napoleon** (ref. 1793) conquered Muslim Egypt, It had no printing press or newspaper. His troops found The Rosetta Stone, carved 198 BC with a decree of Ptolemy 5 in Egyptian Hieroglyphics, Egyptian Demotic, and classical Greek. The Brits invaded and defeated the French army in 1801 and in 1802 took the *Rosetta Stone* to London. Scholars could then read many previously undeciphered texts. It's now in the British Museum.

1798 **Thermodynamics:** **Benjamin Thompson** (1753-1814), Born in Massachusetts, a scientist and inventor. As a loyalist, in 1781 fled to London, abandoning his wife. He was knighted. In 1785, he went to Bavaria to be appointed minister of war (and several other important jobs). In 1791, for his service to the Holy Roman Empire, he was made *Reichsgraf von Rumford* /Count **Rumford**.

**He debunked
the Caloric
theory of
heat.**

Before 1798, heat, called “Caloric”, was thought to be an indestructible, uncreatable, highly elastic, self-repellent, all-pervading fluid which produced, possessed, and transferred heat.

In 1798, **Rumford** saw that the temperature of water in which a cannon was being bored became warmer. He concluded that heat was internal to an object (the cannon and the water) and not some fluid called caloric secreted in the object. He saw that heat could be produced continuously, by, for example, friction, and was thus intrinsic to the metal/water itself.

**The science
of Thermo-
dynamics
was born**

He published *An Experimental Enquiry Concerning the Source of the Heat which is Excited by Friction.* It killed the idea of *caloric*. This discovery was key in the new science of thermodynamics. Thermodynamics is the science of the interaction of heat, work, and temperature, and their relation to energy, entropy, and the properties of matter and radiation.

1799 Political Theory, revolution: The French revolutionaries failed. **Napoleon** returned from his failed expedition in Egypt. The Republic was bankrupt and ineffective. The Directory was unpopular with the French population. On Nov. 9, **Napoleon** led a *coup d'état*. He named himself "First Consul" of the Republic for ten years

Napoleon:
Necessity
is the highest
law. Women
"belong to
the highest
bidder."

Napoleon's philosophy was much like **Machiavelli's**. "Don't talk to me of goodness, of abstract justice, of natural law. Necessity is the highest law." "Soldiers are made to be killed." "A man like me cares nothing for the lives of millions."

"Women are nothing but machines for making children. Public education is not suitable for them; as they are never called upon to act in public. Marriage is all they look to." "Women belong to the highest bidder. Power is what they like, it is the greatest aphrodisiac."

His *Code Napoleon* wiped out nobility and made all *males* equal and women her husband's property. He quoted **Adam Smith**, "England is a nation of shopkeepers."

Legacy of
the French
Revolution

The essential purpose of the French Revolution was to destroy the legal associations between the individual and his government. It succeeded. It had three lasting effects, The rising middle class ended feudalism. It established majority rule and

1799 **Rousseau's** notion of the sovereignty of the people. It caused an upsurge of nationalism to repel the attacks on France by other European countries. The new middle class readily adopted **Adam Smith's** 1776 *laissez-faire* ideas.

Trait de
Mecanique
celeste/
Celestial
Mechanics

Astronomy: **Laplace** (ref. 1783-84, '96) published *Trait de Mecanique celeste /Celestial Mechanics*, 5 volumes 1799-1825. Vol.1 (1799) showed *mathematically* that the solar system was stable following natural laws (no divine intervention) keeping the planets in their orbits, as **Newton** had said.

Celestial Mechanics described all that was then known about planetary notion. He described the solar system in detailed and intricate terms and concluded it was stable

1799 The story is told that after **Laplace** had presented *Trait* to **Napoleon**, that **Napoleon** said, "You have written this huge book on the system of the world without mentioning the author of the universe." **Laplace** said, "*Je n'avais pas besoin de cette hypothese-la*. Sire, I had no need of that hypothesis," The evidence is that **Laplace** was a deist or an agnostic.

1799
Banks in
America

America, economic policy: **Thomas Jefferson**, then Vice President, wrote, "I sincerely believe that banking establishments are more dangerous than standing armies and that the principle of spending money to be paid by posterity under the name of funding, is but swindling on a large scale"

Algebra

Math: **Gauss** (ref. 1796) proved the fundamental theorem of algebra (every polynomial equation has a solution among the complex numbers). He showed a new proof that every integral rational algebraic function of one variable can be resolved into real factors of the first or second degree. In 1801, he developed the theories of binary and ternary quadratic forms. He said he found the possibility of non-Euclidean geometry, but didn't publish it. This prompted more research for non-Euclidean geometry.

England
exported
people
and goods

Colonialism: The overall costs of Britian's empire (colonial bureaucracy, Army, Navy, etc.) exceeded its benefits to England as a whole, but the mercantile class that ran the government, protected by the Army and Navy, got richer. England exported emigrants, prisoners, manufactured goods, and capital, and imported raw materials.

Everyone,
including
children,
worked
from dawn
til dusk

Before 1800, land was the source of most wealth. There were very few bankers or merchants. Those who owned land were wealthy. Those who did not were poor. Over 90 percent of people were peasants / slaves / serfs / peons / natives / low caste. They lived not in cities, almost all illiterate. Money was irrelevant to them. Everyone including children, worked from dawn til dusk, every day, from childhood til death, with lives as **Hobbes** said "solitary, poore, nasty, brutish, and short." City children were abandoned, placed in poorhouses, put to work.

The world
was
connected,

Isaac Asimov: "During the century after **Newton**, it was still possible for a man of unusual attainments to master all fields of scientific knowledge. But by 1800, this had become entirely impracticable. By 1800, the world was connected, dedicated to science and economic facts.

1800-58 Atomic Theory Darwin Electromagnetism-Faraday-Maxwell

1800 Reaction to the French Revolution	<u>Overview: For thousands of years, life for most didn't change much. Around 1800 that changed dramatically. The <i>Enlightenment</i>, science, nationalism, secularism, and liberalism largely ended the Western intellectual and political domination by the Christian churches</u> <u>Politically, socially, the first half of the 19th century was a reaction to the French Revolution.</u> Modern historical consciousness became a central component of intellectual life. Conservatives said the French Revolution was destroying the grandeur of Europe, that violence was intrinsic to revolutions. Similarly, a feeling was growing that Newton's science had caused the technological injustices of the factory owners. The <i>Enlightenment</i> was losing influence to <i>Romanticism</i>. Europe advanced at breathtaking speed, railroads, steamships, factories. The East was not affected.
Faith vs. doubt was a major issue	<u>The conflict between faith and doubt was one of the major issues of the century. <i>The Age of Reason</i> reduced society's financial support to the Church and made the state supreme over public education.</u> It rendered secular the public sphere of society, and established the state's supremacy concerning the content and administration of public education. During the Age of Reason in the 17th and the 18th centuries, the conflict between the state and the church occurred mainly in cities and towns where the educated populations were politically liberal and were anti-clerical and anti-Catholic.
Aryan Christianity said Jesus wasn't a Jew Arianism	<u>A brand of Christianity, Aryan Christianity, attracted both Catholics and Protestants. It denied that Jesus was a Jew and that Christianity evolved from Judaism. It saw Jesus as a Christian warrior come to cleanse the Jews from the Earth. German Arianism became known as <i>Volkism</i>, the font of Nazism, with a leader who would lead the people to a grand destiny by conquering <i>lebensraum</i> / living space. Europe's population more than doubled, even while millions emigrated to the Americas, principally to the US. In the 17th century with Kepler, Galileo, Descartes, Hooke, Newton, science was rational, deducing events. In the 18th, it was empirical, experimenting.</u>
A century of commerce & colonialism. America, a country of economic unrest	<u>It was a century of colonialism and commerce: Railroads (the first in 1825) transformed economies and increased the value of nearby land immensely. Before railroads, land travel was at walking or horse speed. America was a country of unrest, riots, labor strikes, farmers' revolts, renters' strikes, an anti-slavery movement, abject poverty, and ultra-wealth. Government militias protected the rich. Will Durant, "America would have come to dominate the English speaking world without its revolution." Even though the US outlawed importing slaves in 1808, the slave trade expanded greatly to meet the demand for slaves at cotton plantations in the South.</u>
Colonialism was based on racism Europeans controlled world markets	<u>Colonialism: The major European powers colonized the world to establish and control world markets. England and France took over most of Africa; England took the Mid-East and India. Spain and Portugal had South and Central America. (South African Bishop Tutu reportedly later said, "When the missionaries came, they had the bibles and we had the land. They said, Let us pray. We did. When we opened our eyes, we had the bibles and they had the land (Also said by Jomo Kenyatta and a Bantu saying). <u>Colonialism was based on racism. But advances in science & technology and the use of energy were far more transforming to society than political events.</u></u>
Science fueled the 19th century	<u>Technological knowledge: The 19th century saw many technological changes. New technologies did for commerce what printing had done for knowledge. Science became experimental, manipulating biological events. <u>It fueled technological and social change.</u> The merchant class (<i>bourgeoisie</i>) expanded. <u>Science caused employment of millions, manufacturing, mass-produced furniture, cheap cast iron stoves, telegraph, oil, electricity, popular literature, money, the science of economics. Settlements were founded east into Siberia and west to California.</u></u>

1800 Chemistry: Two gasses make a liquid? **William Nicholson** (1753-1815) & **Anthony Carlisle** found

	Chemistry that water could be separated into hydrogen and oxygen by electricity from Volta's pile (a battery).
Jefferson distrusted corporations Jefferson wanted Church state separation. Religions are all based on fables.	1801 Political Theory, democracy: Jefferson's first inaugural, " <u>Error of opinion may be tolerated where reason is free to combat it.</u> " Also in 1801 he wrote regarding corporations, "I hope we shall crush in its birth the aristocracy of our moneyed corporations which already challenge our government. The government is the strongest when everyone feels a part of it." He also distrusted the influence of religion. Jefferson wrote to the Danbury Baptists who feared persecution from the larger Congregationalists, that "the legitimate powers of government reach <i>actions</i> only, not <i>opinions</i> , and the <u>First Amendment</u> established a "wall of separation" between Church and State." The 1905 book, <i>Six Historic Americans</i> quoted Jefferson , "I have recently been examining all the known superstitions of the world, and do not find in our particular superstition [Christianity] one redeeming feature. They are all alike, founded upon fables and mythologies." " <u>The Christian God is a being of terrific character-cruel, vindictive, capricious, unjust.</u> "
Humboldt showed South America to the world	1801 Geography, culture: Baron Alexander von Humboldt (1769-1859) Prussian, <u>greatest geographer, naturalist, explorer, cosmographer, biologist, diplomat, and engineer of the 19th century.</u> He was a citizen of the world, (brother of Wilhelm von Humboldt , ref. 1810). He explored the <u>Orinoco headwaters, saw its natural canal to the Amazon</u> , found unknown tribes, found numerous new plants, designed the first isothermic map, <u>saw the source of quinine, the bark of the cinchona tree (used by S. American natives and the only known cure for malaria.)</u> His expeditions revealed a new America, inspiring other explorers. Simon Bolivar (ref. 1820), the liberator of South America, said that "Baron Humboldt did more for the Americas than all the conquistadores."
Oceans are heat sinks	Humboldt discovered the <i>continental effect</i> of weather. Namely, "As <u>oceans are thermal sinks</u> , places farthest from oceans have more extreme winter <u>and</u> summer temperatures." "The tree line will occur at smaller and smaller latitudes the closer to the poles. It reaches sea level beyond the Arctic and Antarctic Circles. (He wrote a huge encyclopedia of his discoveries. See 1845-Cosmos).
Educational Revolution	1801 Education: Johann Pestalozzi (1746-1827), Swiss, began the modern era of education, supplanting the rigid system dating to Ptolemy , with <i>Wie Gertrud Ihre kinder lehrt/ How Gertrude Teaches Her Children</i> . Said a teacher's job is to develop each child's abilities by handling actual objects, not memorizing words.
The world is as God designed it. The poor are part of God's plan.	<u>Design Argument:</u> Archdeacon William Paley (1743-1805) <i>Natural Theology or Evidences and Attributes of the Deity</i> . said if one finds a watch on a beach, it clearly was <i>designed</i> by somebody. From that he concluded <u>that the world was so well designed that everything was just as God designed it.</u> The poor must be content to be poor, fulfilling God's plan. Darwin in 1859 killed that. Paley's error? He incorrectly assumed that what is true of man-made objects (a watch) is true for living organisms like animals and plants, which grow and evolve naturally without a designer.
The Problem of Suffering	Philosophy: Paley proposed five answers to the <i>Problem of Suffering</i> . 1. Suffering was unintended, 2. There may be matters we are not aware of to justify suffering (Humans limited ability theory), 3. Suffering is seldom violent and long lasting, 4. Death is necessary to avoid overpopulation, and 5. God added pleasure into man's life beyond anything necessary. Paley's works were required reading in Cambridge and Oxford for many years.
1802 Evolution	Biology, evolution: Gottfried Treviranus (1776-1837), German biologist, said simple forms of life had gradually developed into more complex forms; that living creatures can be modified by external influences; and that <u>species develop into other species.</u>
	1802 Geology: After James Hutton (ref. 1785, '95) died, John Playfair (1748-1819), a Church of Scotland minister, a co-founder of the <i>Royal Society of Edinburgh</i> , a professor of natural philosophy, and a mathematician, wrote an easier-to-read version of Hutton's 1795 <i>Theory of the Earth</i> called <i>Illustrations of the Huttonian Theory of the Earth</i> .
Absolute Zero postulated	1802 Physics, gas: Amontons (ref 1699, 1701, '87) and Joseph Louis Gay-Lussac (1778-1850, ref 1787) improved on Boyle's <u>pressure / volume inverse relationship law of gasses.</u> (ref. 1661, '66). Boyle, Amontons, and others had seen that <u>gas expands when heated and contracts when cooled</u> , but they didn't know how much. So physicists deduced that there was a low temperature where a gas shrinks to its smallest possible volume. But they didn't know what temperature it was.

Physics, gas expansion: **Gay-Lussac** (and others) experimented using fire to heat air in balloons to increase the air's *volume* (but not its weight) so that a given mass of heated, thus expanded air in a balloon is lighter than an equivalent mass of cooler air outside the balloon. So the balloon rises.

Due to 1701 technology, **Amontons** in 1701 only had had *air* to heat. **Gay-Lussac** had oxygen, nitrogen, and hydrogen to heat to measure their expansion and/or pressure when heated.

Gasses: **Gay-Lussac** heated different gasses. He saw that different gases expand the same with the same increase in temperature. This is the temperature-volume, positive relationship of all gasses. He also noted a temperature-pressure positive relationship. Finding the precise *amount* of gas's expansion when heated added *temperature* to **Boyle's** 1666 (pressure-volume inverse relationship) *law of gasses*.

Physics, gas: **Jacques Charles** in 1787 had noted a temperature-volume expansion relationship but didn't publish it. **Gay-Lussac** credited **Charles** as he used much of his 1787 unpublished data.

1802 **Combined gas law** Physics, gas: The *measure* of gas expansion when heated is now the **Amontons-Gay-Lussac** Law. This law, with **Charles's** measure (temperature volume expansion) and **Boyle's law** (pressure / volume inverse relationship) form the combined gas law. These three gas laws with **Avogadro's 1811 law** (All gas molecules are the same size) are generalized by the ideal gas law. (see 1808)

1803 **Laws of Chemistry Richter-Fischer** Chemistry, chemical combinations: Recall, law 1. conservation of mass (1789-**Laviosier**), and law 2. (chemicals combine in constant proportions by weight. (1792 **Richter/Proust**). **Richter** detailed this constant proportions law 2. Said that the weights of the two or more elements which separately react with the same weight of a third element are also the weights of those elements which react with each other equally or in a simple multiple of them.)

Dalton's argument that atoms exist. atomic theory Atomic theory: **John Dalton** (1766-1844, ref. 1802-3) Brit, Quaker, born poor, color blind, At 15, he taught math and science at New College in Manchester, a dissenting academy. He saw that chemicals seemed to combine with each other by discrete and consistent units of weight, and he decided to use the word atom (to honor **Leucippus** and **Democritus**) to refer to these units. He proposed that all matter is composed of tiny "atoms". He used the concept of atoms to explain how elements always interact in ratios of small whole numbers.

1803 **Third law of chemical combining. Law of Multiple Proportions** He also announced the Law of Multiple Proportions, law 3 of chemical combinations. It states, If two elements combine to form more than one compound, the ratio of the masses of the second element in each compound can be expressed in the form of small whole numbers. This law combines laws 1 and 2 of chemical combinations, Law 1 (conservation of mass) and 2. (definite constant proportions) This law 3 works for a wide range of compounds and most powerfully supported his and **Boyle's** 1662 atomic theory (matter consists of tiny indivisible atoms). Laws 4 and 5 were discovered in 1808 and 1811.

Limiting substance of a chemical combination The limiting substance of a chemical combination is that component whose amount determines the amount of the desired compound (molecule) that forms. It's the substance that's used up first. Excess amounts of the other substance in a chemical combination remain unchanged. The amount of a compound that is formed when the limiting substance is completely used up is called the theoretical yield of that compound. (The actual yield is always slightly less than the theoretical yield.)

1803 **Henry's Law** Gas-liquid solubility: **William Henry**, (1774-1836) Brit chemist showed that the the amount of dissolved gas in a liquid is directly proportional to the pressure in the container.(why sodas fizz)

The US buys France's claim to the territory of Louisiana, from New Orleans to the Rockies and Canada Political Theory, The Louisiana Purchase: Under **Jefferson**, the US bought France's claim to "Louisiana," a territory as large as the then US. It stretched from New Orleans northwest to British America (Canada) and from the Mississippi to the Rockies. France "owned" but didn't physically control it. France had merely obtained Spain's claim to the land in 1801. France's *claim to ownership* was based on Pope **Nicholas's** 1452 "doctrine of discovery" which said to Europeans that Christianity and European civilization was superior to all other peoples, so deserved to rule, and whichever European country *first discovers* a new land owns it. France was then fighting a slave rebellion in St. Domingue (Haiti).

Louisiana Louisiana of course belonged to the hundreds of Indian tribes living there. France controlled only a

- Purchase** tiny speck of the territory, namely, New Orleans, population c.8,000 and a few small fur trading settlements, the largest of which was St. Louis, about 1,000 people. Louisiana territory itself was over time settled and taken from the Indians who lived there. The US government over the years made hundreds of treaties with Indian tribes to buy their land but never honored the treaty obligations.
- 1803 **Wave theory discovered** Physics, Optics: Thomas Young (1773-1829), Brit, using a two slit experiment, discovered interference of light. This provided good proof of **Huygens's Wave Theory** (ref. 1690). He even correctly posited that different colors had different wave lengths. (ref. 1665, '72-**Newton**). **Young** said the fringes at the edges of shadows resulted from light being a wave. The wave theory began its ascendancy over Newton's corpuscular theory, but had one important difficulty: if light is thought of as a longitudinal wave, that makes it difficult to explain the double refraction effects in certain crystals. Separately, **Young** was the first to measure and describe astigmatism, and to explain that color sensation is due to structures in the eye's retina corresponding to red, green, and violet. In 1808, he introduced the word "energy." He showed that light acted as a wave. This was published and became well-known. Then most scientists accepted **Huygens's** wave theory over **Newton's** corpuscular theory. . Each point of light at the front of a wave is regarded as a source of secondary wavelets.)
- 1804 **Barbary War** Tripoli and Morocco captured a large American frigate. In 1804, Jefferson sent American irregulars who attacked Tripoli from the land, blew up the ship, freed the American prisoners. A 1805 treaty ended tribute to Tripoli. (The *Marine hymn*: "From the halls of Montezuma to the shores of Tripoli, we will fight our nation's battles, in the air, on land and on the sea. First to fight for right and freedom And to keep our honor clean; We are proud to claim the title of United States Marine.)
- 1804 Law: Napoleon declared himself emperor. His Code Napoleon wiped out nobility and made all men equal and women their husband's property. (See 1532 for his cynical use of religion to govern.)
- 1804 Technology: Richard Trevithick (1771-1833) Brit, mining engineer, built the first high pressure steam engine and the first full-scale working steam railway locomotive at the Penydarren ironworks in Wales.
- 1804 **Haiti** Slave revolt: From 1791-1804, slaves successfully rebelled against French colonial rule in Saint-Domingue (Haiti). Their revolution was the only slave uprising that led to the founding of a sovereign state free from slavery and ruled by non-whites. It was a defining moment in the history of the Americas. The slaves abolished slavery and then defended their freedom.
- Slave Revolt** Haiti reverberated throughout the Americas. The revolution was the largest slave uprising since **Spartacus's** unsuccessful revolt 1,900 years earlier. It challenged White claims of Black inferiority. The rebels' organizational capacity and tenacity inspired stories that shocked and frightened slave owners in the Americas. African-American historian **W E B DuBois** said that the revolution caused the British parliament to accept abolition. The US did not recognize the new Haitian government.
- 1804 Physics, hot air balloon: Gay-Lussac and Jean-Baptiste Biot built a hot-air balloon that went up 4.4 miles in an early investigation of the Earth's atmosphere. They collected samples of the air at different heights to record differences in temperature and moisture.
- Physics, chemistry: Gay-Lussac and Alexander von Humboldt (ref 1801) discovered that the composition of air (oxygen-nitrogen-CO₂ ratio) does not change with lower pressure (at high altitude).
- 1806 **Atomic theory only accepted a century later.** Dalton's (and Boyle/Leucippus/Democritus's) atomic theory was not yet proved but Dalton used it to successfully predict the chemical properties of elements and compounds. In 1806, he studied atoms's sizes and how they combined into different substances. This is the basis of chemistry. Atomic Theory is extremely important but was not fully accepted until Jean Perrin (1870-1942) studying minute particles suspended in liquids verified Einstein's explanation of atomic theory confirmed it. The atom was then thought to be the tiniest piece of any particular element.
- 1806 **American dictionary** Education: Noah Webster (ref. 1783), American, published Compendius Dictionary of the English Language, with 5,000 words not found in any other dictionary. The dictionary was his life's work. To prepare it, he learned 20 languages and spent a year in libraries in Cambridge and Paris. (See 1828).

- 1807 The Geological Society, London, was founded. **Robert Fulton**, American, built the first practical steamboat.
- 1807 **Electromagnetism Timeline**, pp. 422-31
Chemistry: **Sir Humphry Davy** (1778-1829) Brit, showed that the essential element of **Volta's** battery is a chemical action, as pure water carries no electrical current. (Salt water does.)
He argued that chemical effects are electrical. Saw that an electric current applied to chemicals could produce new chemicals. He isolated six elements and invented an electric arc light. The full *Electromagnetism Timeline* (pp. 422-431) includes relevant chemistry events.
- 1807 **The Heat Equation**
Thermodynamics: **Jean-Baptiste Joseph Fourier** (1768-1830), published *On Propagation of Heat in Solid Bodies*, in which he formulated one of the most important discoveries in the history of physics and thermodynamics, the heat equation, the equation that governs this evolution of temperature, how heat /thermal energy transfers from a hot substance to a cool one.
His fame is due, above all, to the complex method he developed to solve this equation.
- 1807 **Slavery**
Slavery: Countries began to ban slavery: Prussia in 1807. England and the US banned importing slaves in 1808, but US ships ignored the ban. An estimated 250,000 slaves were brought to America 1808-1861 on American ships. Argentina abolished slavery in 1813, Mexico in 1829, French colonies in 1838, India (under the Brits) in 1843, and Brazil (independent in 1822) in 1888.
- 1807-08 **Address to the German Nation**
Political Theory, nationalism: **Napoleon** had defeated the German princes and occupied Berlin in 1806-07. Germany was not then a nation, merely many German speaking states, principalities, free cities, with little feeling of national unity.
Johann Gottlieb Fichte (ref 1796) changed that. He wrote *Reden an die Deutsche Nation / Address to the German Nation*, 14 lectures he gave to small audiences in Berlin in 1807-08.
- Reden an die Deutsche Nation.**
Fichte blamed the German princes's defeat by Napoleon on the degeneration of the German spirit. He said the German folk were the purest race, that they had the moral right to fulfill Germany's destiny by every means of cunning and force. He based his theory of German superiority on the German language, which he said unites people more than any other factor.
He hated Jews, said they could never be true Germans. He became a national hero.
A national movement based on his ideas developed, but Germany did not unite into a nation for 65 years. He was the first major prophet of German nationalism.
Georg Hegel (1821) and **Frederich Nietzsche** (1882) further inspired **Hitler's** later National Socialist ideology of state despotism and racial supremacy of the German folk.
- The three prophets of German nationalism, Fichte, Hegel, and Nietzsche**
- 1808 **Law 4 of Combining gasses**
Chemical combinations, **Law 4: Gay Lussac** (ref 1805) stated his Law of Combining Gasses, a/k/a the *Law of Gaseous Volumes*. From his own and others' experiments, he deduced that for gases "At the same temperature and pressure) the ratio of the *volume* of gasses consumed or produced in chemical reaction is a ratio of simple whole numbers, coefficients in the balanced equation.
How so? This became understood in 1811 with **Avogadro**. **Gay Lussac's Law 4**, his *Law of Combining Gasses* is another form of the law of definite proportions.
The only difference between these two laws of chemical combination is that **Gay Lussac's** Law is stated with respect to *volume* while the law of definite proportions concerns *mass*.(see 1811)
- 1808 **Physics, gasses: Guillaume Amontons** in 1701 had first formulated **Gay-Lussac's Law**, that in a fixed container, gas *pressure* increased linearly as the *Kelvin temperature* rises. He did not have precise measuring devices and the **Kelvin** scale with its zero absolute cold was not yet known.
But, an accurate pressure gauge in a fixed container would show the gas's *pressure* rose about 1/273 for each Celsius degree rise or, if in a flexible container, its *volume* rises 1/273.
(When temperature zero of the kelvin scale was determined, it was just over minus 273 Celsius)
- Dalton book on atomism**
Physics: **Dalton** published his *atomism theory* in a book *New System of Chemical Philosophy*. Due to the limitations of his observation and measuring tools, all evidence of atoms was still indirect and inferred. He published that these atoms could neither be divided or destroyed, and all atoms of an element are atoms of other elements have more or less protons and neutrons. (**Boyle** in 1662 had also said that matter was made of tiny bits).
- 1808 **Slavery**: Congress outlawed importing slaves. New York City had one of America's largest slave market (on Wall Street) for much of the 18th century. It was also a center of

finance for America's slave trade, even long after Congress prohibited importing slaves.

1809 Bentham **Utilitarianism** **Philosophy, ethics:** Between 1809-23, **Bentham** (ref. 1780) researched religion with the declared aim of destroying religious beliefs, and religion itself from the minds of men. His philosophy, *Utilitarianism* was revised and expanded by **Bentham's** student and godson, **John Stuart Mill**. **Mill** disagreed with **Bentham's** view of human nature, which didn't recognize conscience as a human motive. In **Mill's** hands, "Benthamism" became a major element in the liberal conception of state policy objectives in his book, the influential *On Liberty* (1859). "Natural rights" were powerful and appealing ideas to many people, like **Locke** and **Jefferson**, as we have seen.

1809 Lamarck: Philosophie Zoologique **Evolution was a live subject** **Biology:** Evolution was a live subject among biologists. **Jean-Baptiste Pierre de Lamarck** (1744-1829), French, deist. Like **Erasmus Darwin**, he was an early proponent of evolution. In *Philosophie Zoologique*, he correctly said organs develop through use and wither through disuse. He contributed to evolutionary theory with the first truly cohesive theory of biological evolution, in which an alchemical complex force drove organisms up a ladder of complexity, and a second environmental force adapted them to local environments through use and disuse of characteristics, differentiating them from other organisms.

He erred first with his theory of an alchemical force making new more complex organisms and then when he said that parents pass along traits acquired during their lifetime, such as baby giraffes have long necks because their parents stretched their necks to reach high leaves.

This theory of inheriting traits acquired during an organism's lifetime long predated **Lamarck**. It made sense to many including **Charles Darwin** for a time, but he later correctly discarded it.

Evolution **Biology:** Like other contemporary evolutionists, **Lamarck** said variations of animals acted within limits, that is, different colored pigeons could have a common ancestor but a bear and a dog could not. (They do if you go back far enough.) We now know that the carriers of specific physical characteristics that a parent passes to offspring (now called genes) that determine an offspring's makeup are set at the parents' conceptions.

1810 **Physics, color:** **Goethe** published his *Theory of Colors*. It differed with **Newton's** mechanistic analysis of color. It had little science. It emphasized the sensory enjoyment of colors and appealed to artists, not scientists. **Goethe** was not a romantic or religious but he opposed **Newton's** mechanistic world.

Goethe Quotes **Reason is never popular.** "Art is long, life is short, judgment difficult, opportunity fleeting." "Live dangerously and you live right." "Mysteries are not necessarily miracles." "Nothing is more terrible than to see ignorance in action." "It is much easier to recognize error than truth; error is superficial and may be corrected; truth lies hidden in the depths." "Passions, emotions, may be made popular, but reason remains ever the property of the few." "To rule is easy, to govern difficult." "None are more hopelessly enslaved than those who falsely believe they are free."

Immortality is for ladies who have nothing to do. "A useless life is an early death." "A clever man makes no minor blunders." "Nothing is more odious than the majority, for it consists of a few powerful leaders, a certain number of accommodating scoundrels, and submissive weaklings, and a mass of men who trudge after them without thinking." "This occupation with immortality is for people of rank, and especially for ladies who have nothing to do." Like **Spinoza**, **Goethe's** God was nature.

1810 **Education:** **Wilhelm von Humboldt** reformed the Prussian education system, with free primary education, the gymnasium system for elite students, and tax supported universities. He opposed government imposition of religion.

He founded Berlin University. It became the model for other universities in Prussia.

In England, *Mechanics Institutes* taught better science than Anglican-controlled Oxford or Cambridge. Oxford expelled poet **Shelley** for his atheism. He lost custody of his children for the same reason.

1811 **Medicine:** Sir **Charles Bell**, Scot, researched the anatomy and physiology of the nervous system. He wrote *New Ideas of the Anatomy of the Brain*. It was as significant as **Harvey's** circulation of blood.

Law 5 of chemical combination **All gas atoms** **Chemistry, physics:** Italian **Romano Amadeo Avogadro**, Count of Quaregna and Careto (1776-1856), (ref 1808) proved the fifth basic law of chemical combinations, *the Law of Gas Volumes*. He published that the smallest unit of some gases were not atoms of one gas but *combinations*

& molecules are the same size

Law applies only when the product is a gas

of atoms (now called molecules, like CO₂ (carbon di-oxide). Until then there was no clear distinction).

He said that in same sized containers (at same temp and pressure.) all gases have the same number of molecules (or atoms if the atom itself was a gas). Example: One *volume* of carbon monoxide gas, CO, combined with one *volume* of oxygen gas, O, does not make two *volumes* of the gas CO₂. It makes just one volume of CO₂, a heavier gas, but occupying the same space as any gas. (The formula is O + CO = CO₂)

This is because every atom or molecule of any gas is the same size (occupies the same space) as any atom or molecule of any gas, no matter how many atoms or molecules it is. (An atom of oxygen, O, normally exists as an O₂ molecule. But that is not relevant to this illustration. Both are called oxygen)_

His law *only applies* when two or more gasses combine to produce *another gas*.

This does not mean that a gas cannot be compressed or expended. **Gay-Lussac** (1808) and **Avogadro's** law applies when the gasses involved are at the same pressure and temperature.

This reconciled **Dalton's** atomic theory with **Gay-Lussac's** idea that some gases were composites (molecules) of different fundamental substances (atoms) in integer proportions. His theory was not generally accepted until 1860 after he died (See 1814-Chemistry and 1860-**Avogadro**)

1812-14 Psychology, **Napoleon's** hubris: In the fall of 1812, **Napoleon** led a *Grande Armee* of 685,000 French and allied troops to conquer Russia. Russia retreated, burning all potential foodstuffs for the invaders. So his troops were reduced by one half by the time he entered a deserted Moscow. He retreated to France in 1813-4. in the bitter cold with under 50,000 frostbitten starving survivors. History has many stupid wars (like the crusades and America's Viet-Nam war), and this was one of the stupidest. In 1814, European armies captured Paris and captured **Napoleon**. He was exiled to Elba (an island in the Med near Italy).

1812 Mathematics, probability theory: the mathematical theory of processes involving uncertainty such as gambling. Probability theory enabled **Darwin's** natural selection and **Clerk-Maxwell's** theory of statistical mechanics. ("The race is not to the swift, nor the battle to the strong [*Ecclesiastes* 9:11], but that's the way to bet it." **Damon Runyon**)

Théorie analytique des probabilités

Laplace (ref. 1783, '96, '99) published his *Théorie analytique des probabilités* wherein he described many fundamental results in statistics. The first half of his treatise dealt with probability methods and problems, the second half with statistical methods and applications.

Principles of probability. Essai philosophique sur les probabilités

In 1814, **Laplace** described a math system of *inductive* reasoning based on probability, which today would be Bayesian, *Essai philosophique sur les probabilités*. His first six *principles of probability*:

1. Probability is the ratio (odds) of the "subject event" to the total possible events.
2. The first principle assumes equal probabilities for all events. If this is not true, one must first determine the the probability of each event. Then, the probability is the sum of the probabilities of all possible subject events.
3. The probability of the occurrence for independent events is their probabilities multiplied together.
4. For events not independent, the probability of event B following event A (or event A causing B) is the probability of A times the probability that A and B both occur.
5. The probability that A will occur, given that B has occurred, is the probability of A and B occurring divided by the probability of B.
6. Three corollaries are given for the sixth principle, which amount to Bayesian probability.

1813 **A humane capitalist**

Capitalism: **Robert Owen** (1771-1858), Brit, published *A New View of Society, or Essays on the Formation of the Human Character, to reduce factory workers' misery with humane working conditions*. It described his ideas of a humane system of capitalism. (He acted on his principles. See 1825)

1814 **Laplace's Demon "Now" is the effect of the past and the cause of its future. (Still true)**

Physics, math: **Laplace** (ref. 1783, 96, 99, 1812) wrote that correctly analyzing a collection of all relevant information would tell the future of the world. He said, "The present state of the universe is the result of the past and the cause of its future.

In other words, An intellect which at a certain moment which knew all forces that set nature in motion and all positions of all items of which nature is composed could know the future.

. If this intellect were also vast enough to submit these data to analysis, it would embrace in a single formula the movements of the bodies of the universe and those of the tiniest atom; for such an intellect nothing would be uncertain and the future just like the past would be present before its eyes." (Believers in God believe it has such knowledge and thus knows the future.)

- Buckminster Fuller** (**Buckminster Fuller** (1895-1983), American genius, in 1960 said that a *physical* economic-trade model of the world (all the ships and trucks and their cargoes, etc.) would predict world trade. Similarly, currently, some highly-educated Wall Street geniuses have tried to build computer models with presumably all relevant physical/economic/ social /political / weather data, to predict interest rates, etc. One such effort so far failed spectacularly.)
- Big claims need big proof** **Laplace** said, "The weight of evidence for an extraordinary claim must be proportional to its strangeness." (**Carl Sagan** was simpler, "Extraordinary claims require extraordinary evidence.").
- 1814 Chemistry, gases: **André-Marie Ampere** (1775-1836, ref 1825) published the same law as **Avogadro** (ref. 1811) with similar conclusions. As **Ampere** was better known, the law was first called **Ampere's** hypothesis, but later as the **Avogadro–Ampere law**.) It was used in the 1834 development of the ideal gas law, but fully accepted by scientists only in 1860 after **Avogadro** died. (See 1834 and 1860)
- 1814 Physics, optics: **Joseph von Fraunhofer** (1787-1826), Bavarian, created a spectroscope (a device to show and observe a spectrum of light or radiation from any source). His spectroscope had an achromatic telescope objective lens. He also developed diffraction grating (see *Index*). He saw lines in sunlight's spectrum, now called **Fraunhofer** lines. He discovered that some nebula were gaseous and that the spectrum of a ignited solid is continuous. (More spectroscope at 1859)
- 1815 Evolution: **Lamarck** added humans to his theory that all species evolved. He improved **Linnaeus's** 1735 system to classify animals; said fossils helped determine past climates. (more **Lamarck** 1859, '73, 1900)
- 1815 Geology: **Tambora**, E. of Java, erupted, biggest eruption in 10,000 years, ejected rock and ash, blocked sunlight worldwide. 1816 had no summer. Failed crops caused the worst famine of the 19th century.
- William Smith.** Geology: **William Smith**, Brit, canal construction supervisor, deduced that one could determine the relative, but not absolute, age of rocks, by studying which fossils appeared at which levels of sedimentary rocks. Fossils were found of *extinct* species. This contradicted the *Bible*.
- age of rocks** He also noted that fossils in the upper / more recent layers were more complex than those in lower/ older layers. He published the first geological map of all England. He verified **Hutton's** work' He was called the Father of English geology by the new (1807) Geological Society in London.
- 1815 Napoleon's 100 days: **Napoleon** (ref 1812-14) escaped from Elba, gathered 700 troops, returned to France, raised an army, but, near Waterloo, Belgium, an army mainly of Prussians, some Belgians, Dutch, and a few Brits defeated him. Lord **Wellington**, Brit, staying in a nearby town, wrote the report about it, so he took credit for the Prussians' work. **Napoleon** was exiled to tiny British St. Helena (remote S. Atlantic). **Napoleon** there said, "Mohammedanism is less ridiculous than Christianity." "If I had believed in a God of rewards and punishments, I might have lost courage in battle." He lived there for 6 years and died at 52
- Napoleon's legacy: widows, orphans** **Robert Ingersoll** (1870) was not impressed with **Napoleon**. After visiting his tomb, wrote, "I thought of the orphans and widows he had made; of the tears that had been shed for his glory and of the only woman who ever loved him pushed from his heart by the cold hand of ambition. I would rather have been a French peasant [than] that imperial impersonation of force and murder known as **Napoleon** the Great."
- Count Metternich** Political Event: With **Napoleon** gone, Austrian Count **Klemens von Metternich** reestablished the old political order in Europe at the *Congress of Vienna*, with England, Russia, Prussia, and Austria. Papal states were returned to the Church. Germany stayed separate entities. **Metternich's** plan lasted til 1914.
- 1815 Literature: Sir **Walter Scott** (ref 1750), invented the modern historical novel with *Waverley*, *'Tis Fifty Years Since*, *Guy Mannering*, *Old Mortality*, *Ivanhoe*, & *Red Gauntlet*. All were based on the idea of cultural conflict.
- 1817 **David Ricardo** Capitalism: **David Ricardo** (1772-1823), Brit, banker, *On the Principles of Political Economy and Taxation*, said that "labor is the most important factor that adds value to a product." This was at best a simplistic theory, and false. Many factors give value to a product, its rarity, its beauty, advertising, its utility, its popularity, but the only true measure of a product's value is the market, namely what it sells for.
- Wages must be kept down to keep profits up.** **Ricardo** said "The "natural" price of labor is that price necessary to enable the poor to just subsist and perpetuate their race, without increase or diminution." "There is no way to keep profits up but by keeping wages down. If workers were paid more than a subsistence

How do we venerate greed?	wage, they would have more children and there would not be enough food for everyone.” “The interest of the landlord is always opposed to the interests of every other class in the community.” This was his law of rents. Ricardo’s theory was of course welcomed by the greedy wealthy. John Kenneth Galbraith (1908-2006), a Canadian-American author, economist, and diplomat in 1963 said, “<u>The modern conservative is engaged in one of man’s oldest exercises in moral philosophy, finding a superior moral justification for selfishness.</u>”
The Iron law of wages	<u>Economics</u>: German economist Ferdinand Lassalle (1825-’64) first used the phrase, “Iron Law of Wages” in reference to Ricardo’s law of rent and the 1798 population theory of Thomas Malthus. Ricardo’s “law” was based on the premises that capital is more or less immobile and labor is highly mobile. Actually it’s the opposite. Capital is totally mobile and labor live in houses, not tents.
1818 Natural Selection	<u>Biology, evolution</u>: William C Wells (1757-1817), Scot, a doctor and member of the <i>Royal Society</i>, In 1813 read a paper to the Royal Society describing the process that Darwin 40 years later called <i>natural selection</i>. The <i>Royal Society</i> published it in 1818 (after he died). Wells applied it only to humans. He used the phrase “better fitted” for those siblings who survived and <u>reproduced the most</u>. Darwin and Wallace were unaware of Well’s work in 1859, but when Darwin saw it, he credited Wells as the first recognition of <i>natural selection</i>.
1818 The World as Will and repre- sentation	<u>Philosophy</u>: Arthur Schopenhauer (1788-1860) German (Gdansk), pessimist. Best known for <i>Die Welt als Wille und Vorstellung / The World as Will and Representation</i>. Sometimes translated as <i>The World as Will and Idea</i>. Building on the transcendental idealism of Immanuel Kant (1724–1804), Schopenhauer developed an atheistic metaphysical and ethical system that rejected the contemporaneous ideas of German idealism.
Schopenhauer Quotes Nationalism. Most people can’t think. They just believe.	<i>The World as Will and Idea</i> said “Only through history does a nation become <u>completely conscious of itself</u>. The greatest intellectual capabilities are only found in connection with a vehement and passionate will. Most men. . . are not capable of thinking, <u>but only of believing</u>, and. . . are not accessible to reason, but only to authority. His main idea was, “The world is my idea—this is a truth for every man, since the world as it is known depends for its character and existence upon the mind that knows it.” “Humans are the only animal which causes pain to others without any further purpose than just to cause it.” He was the first to say that there was <u>something more important than knowledge or intellect</u>, namely the <i>will</i> to live. He believed that the world has a double-aspect, namely a “will” (a mindless, aimless, nonrational impulse at the foundational being of everything) and a “representation”(what we see around us.
The world is a mindless machine	Schopenhauer said <u>will was inherently evil</u> so the best one could do was to renounce desire. He said that this was not the best of all possible worlds, but the worst, a mindless machine of self-inflicted suffering, among whose cleverest devices are precisely the philosophical theories of technology and progress. (Neitzsche, Freud, and Hitler were influenced by him).
Miserable fools embrace nationalism, patriotism.	“<u>Philosophy</u>: is a science, and as such has no articles of faith; so, in it nothing can be assumed as existing except what is either positively given empirically, or demonstrated through indubitable conclusions.” “<u>Every miserable fool who has nothing at all of which he can be proud adopts as a last resource pride in the nation to which he belongs.</u>” (An attitude encouraged by the ruling class. See 1532) “There is no absurdity so palpable but that it may be firmly planted in the human head, if only one begins to inculcate it before the age of five, by constantly repeating it solemnly.”
Problem of Suffering	“<u>A certain amount of ignorance is the condition of all religions</u>, the element in which they can exist. Religious doctrines founded merely on authority, like miracles, and revelations, are only suited to the childhood of humanity.” “<u>There are two things which make it impossible to believe [in God], the misery which abounds everywhere</u>, and the obvious imperfection of its highest product, man.”
Schopen- hauer Quotes 1818	“To repeat abstractly, universally, and distinctly in concepts the whole inner nature of the world, and thus to deposit it as a reflected image in permanent concepts always ready for the faculty of reason, this and nothing else is philosophy.” “Happiness consists in frequent repetition of pleasure” “<u>When we read, another person thinks for us</u>: we merely repeat his mental process. . . . In reading; the greater part of the work of thought is already

done for us. This is how it relieves us to take up a book after being occupied with our own thoughts. And in reading, the mind is, in fact, only the playground of another's thoughts."

Reading too much makes people lose the ability to think

"So it comes about that if anyone spends almost the whole day in reading, and by way of relaxation, devotes the intervals to some thoughtless pastime, he gradually loses the capacity for thinking; just as the person who always rides, at last forgets how to walk." "This is the case with some learned persons: they have read themselves stupid." "Man is never happy, but spends his whole life striving after something which he thinks will make him so." (1851)

1818
Proposed Basic Laws of thought

Schopenhauer argued that humans are both knowers and willers. As knowers, humans have a view from without (the cognitive view) and as a free-willing being, Humans have a view from within (the conative view). **Schopenhauer** posited a fourth law of thought to **Aristotle's** three basic laws of thought (1. Everything that exists, is. 2. Nothing can be and not be at the same time (the contradictions rule), and 3. Everything either is X or is not X.)

Schopenhauer proposed, "Of every thing that is, it can be found out why it is." (But, in 1844, he decided that those four laws could be reduced to two, the law of the excluded middle and that of sufficient reason." He ridiculed **Anselm's** ontological argument as a "charming joke."

He ignored women; he liked demigods and dogs as they were free from the failings of men.,

The Qur'an is the saddest and poorest form of theism.

Schopenhauer was also violently critical of Islam and *the Qur'an*. "Man can do what he wills, but he cannot will what he wills." "Consider the *Qur'an*, this wretched book was sufficient to start a world religion, to satisfy the metaphysical need of countless millions for twelve hundred years, to become basis of their morality and of a remarkable contempt for death, and also to inspire them to bloody extensive conquests. In this book we find the saddest and poorest form of theism. Much may be lost in translation, but I have not been able to discover in it one single idea of value."

1819
Specific heat is inversely proportional to atomic weight

Physics, chemistry: "Specific heat" is the amount of thermal energy / heat an object or a substance can hold or the amount that is transferred in any given process. Different substances need different specific amounts of thermal energy to raise their temperature.

A hot substance contains much thermal energy, a cold substance less.

Pierre-Louis Dulong (1785-1838) and **Alexis-Therese Petit** showed that the *specific heat* of a gas was inversely proportional to its atomic weight (all components of an atom). The higher the atomic weight, the less thermal energy /heat the gas it could hold. Specific heat is easy to deduce, so it is used to determine a gas's atomic weight.

The amount of energy held or transferred is now measured in *joules*, British Thermal Units (BTUs), or calories. 1000 calories = 4,186.8 joules = 3.9683 BTUs. The rate of transfer of thermal energy (heat) is measured in watts. (more thermodynamics 1847, '50, '75, 1906, '35) .

Witchcraft: **Jacob Pandian**, a current anthropologist, said, "During the 19th century, believers argued that magic, witchcraft, i.e., obvious religious frauds, but modern religion (i.e., without witchcraft) showed itself only in the higher stages of human mental development."

Religions oppose, then brag about scientific benefits

This is a vain distinction. Any supernatural belief is as true or false as *any* other supernatural belief. **William Jennings Bryan** correctly said, "One miracle is just as easy to believe as another."

Beyond logic, there are absolutely no standards, no way of judging, no limits, for what beliefs are accurate. If one believes in a supernatural force, one can believe *anything*.

Pandian said, "The intellectual history of the past 500 years has been religion attempting to stifle but then take credit for scientific discoveries as religious truth."

1820s
Childhood didn't exist.

Capitalism, exploiting children: Western countries had no concept of childhood. **John Locke** had said that children of the poor should work for some part of the day when they become 3 years old. The English *Factories Act* of 1819 banned children under nine from working in factories, but children 9-16 could work 12 hours per day. Poor families in Europe sold their children. American colonists as early as the 1600s imported such children to work at no wages, just room and food.

Children worked in factories long hours

Samuel Slater, called the "Founder of the American Industrial Revolution," used children 7-12 years old in his textile mills. He also used women extensively, at pitiful wages.

In response to these capitalistic practices, various groups began to question the its fairness. In the 1820s, it got so cruel that some American states began to pass laws limiting hours and ages a child

could work. Massachusetts ruled that children must be at least 10 to work in textile mills. Pennsylvania said 12 years old. Connecticut ruled children at 14 could work only 12 hours per day. Women had no such absurdly puny “protections.” Women were atrociously mistreated in factories and mines. . .

This was during the second *Great Awakening*, an outpouring of religious fervor when Protestants like **Madison** demanded an end to state supported religions in order to foster more religions to thrive.

**American
democracy
began with
Jackson**

Social reform ideas grew. In the U.S., persons without property could vote only due to the *Jacksonian Revolution* of the 1820-1830s. **Will Durant's** *Story of Civilization* describes numerous socialist (government run) economies from ancient Sumer and Babylonia through the Middle Ages (mainly towns) to modern times.

**1820
Simon
Bolivar**

Political Theory, independence: **Simon Bolivar** (1783-1830) the liberator of South America, abolished inquisitions, became an atheist, so he was excommunicated. In every South and Central American war for independence from Spain, the Catholic Church with its *Inquisition* sided with Spain, not with the peasants fighting for independence. The Catholic *Inquisition* formally ended in 1834, but in 1850, an *auto-da-fe* (public roasting of Jews and heretics) was performed in Mexico.

**Priests
dread
science
as witches
dread
daylight**

Science: **Jefferson** built the University of Virginia as a secular college. He wrote a colleague, “There exists indeed an opposition to [UVA] by friends of William and Mary, which is not strong. The most resistive is that of the priests of the different religious sects, who dread the advance of science as witches do the approach of daylight.” In this, the Presbyterian clergy take the lead.

The tocsin is sounded in all their pulpits, and the first alarm denounced is against the particular creed of **Cooper** and as impudently denounced as if they really knew what it is.” (**Thomas Cooper** was a prominent chemist with liberal views. He became president of **Dickinson College**.)

Jefferson: “The main object of all sciences is the freedom and happiness of man.

**1820
Jefferson
“Bible”**

Christianity: He wrote, “Of all the systems of morality, ancient or modern, which have come under my observation, none appear to me so pure as that of **Jesus**.” So, at 77, **Jefferson** compiled a book titled *The Life and Morals of Jesus of Nazareth*, a compilation of Jesus’s ethical sayings. It has no religious references. He said they were “the most sublime and benevolent code of morals which has ever been offered to man.” It is now called the **Jefferson Bible** but has no religious passage.

1820 Judaism: Many Jews and rabbis began to ignore traditional rules. **Abraham Geiger** (1810-74), a reform rabbi, who studied the *Torah* in secular terms, said its varied themes, authors, contradictions could not bind Jews in the modern age. Scientific Judaism, a secular movement, grew, with non-Jews.

1821 Political Theory: **Henri Compté de Saint-Simon** (1760-1825) French reformer, *The Industrial System*, Class conflict will be eliminated when a socialist state is governed by technicians and scientists.

1821 Pope **Pius 7** revoked the Church’s 1543 denunciation of **Copernicus’s** heliocentrism.(268 years late)

**Faraday
invented
the electric
motor**

Electromagnetism: **Michael Faraday** (1791-1867) most important inventor /discoverer of electromagnetism. Brit, born poor, a bookbinder’s apprentice at 13, taught himself by reading about electricity. In 1807, became a expert chemist as **Davy’s** assistant. (ref. 1807) He showed that electrical forces could produce motion by passing a current through wires which pulled magnets attached to an axle that then rotates. (In 1831, he also showed the opposite, that motion could produce electricity. So, a car’s starter motor is also its generator. His life was science. He turned down a knighthood and the presidency of the *Royal Society*.)

**The full
Electro-
magnetism
Timeline is on
pp. 422-431**

He built two devices that produced “electromagnetic rotation,” i.e., an electric motor. His key insight was the concept of a field around an electric current that pulled the magnets attached to the axle of the device. A gravitational “field” and a magnetic “field” surrounds all objects, including the Earth.

He saw that the “force” of magnetism decreased with distance, like gravity. The universe consists of fields. His experiments and inventions formed the foundation of modern electromagnetic technology. Scientists began to determine if and how other forms of energy could be linked.

**German
nationalism.
Individuals**

Philosophy, nationalism: **Georg Wilhelm Hegel** (1770-1831) The second of the three main prophets of German nationalism, wrote *The Philosophy of Rights/ Der Philosophie des Rechts*. It idealized the role of the state. He was influenced by **Fichte** and **Kant**. He gave German idealism

don't matter. The world-spirit is the true justification for God. a comprehensive system of thought. He saw human history as the progress of the consciousness of freedom, offering no opposing materialistic viewpoint. What is actual is rational and what is rational is actual. He said history is the unfolding self realization of the world-spirit, that war made one realize that some things, like goods and peoples lives, matter little. . Through war, the moral health of the people is preserved." This process is the true justification for God. **Hegel's** view encouraged a new wave of war-worship in Europe. (See 1870-Germany)

Absolute Spirit **Hegel** took **Kant's** mind-ordered world from the human level to the cosmic one, creating an awesome system into which all past, present, and future experience and thought fit together rationally in an encompassing dialectic that is constantly evolving toward supreme self-consciousness/*Absolute Spirit*.

Thesis, antithesis, synthesis. Repeat, **Hegel** wanted to see some idea or *Universal Mind* in concrete reality. As opposed to **Aristotle's** syllogisms, **Hegel** posited a *thesis* which begets an *antithesis* which conflict is resolved by a *synthesis*, that becomes a new *thesis*, and so on. He said, "The *Absolute Spirit* is behind all developments in the world. Then we'll know all and see God.

Reason is the sovereign of the world Philosophy is that which grasps its own era in thought. In his *Philosophy of History*, **Hegel** wrote, "The only thought which philosophy brings with it to the contemplation of reason is that history is the simple conception that reason is the sovereign of the world; that the history of the world, therefore, presents us with a rational process."

Hegel quotes "The State is the embodied Morality. It is the ethical spirit which has clarified itself and has taken substantial shape as will, a will which is manifest before the world, which is self conscious and knows its purposes and carries through that which it knows to the extent of its knowledge." Custom and Morality are the outward and visible of the inner essence of the State." "Experience and history teach us that people and governments never learned anything from history, or acted on principles deduced from it."

The state is an end in itself. Nationalism "The state, being an end in itself, has the maximum of rights against the individual citizens, whose highest duty is to be members of that state." Soon, some philosophers embraced, theoretically, the idea of change, accepted strife as essential to progress, saw things as parts of a whole, and themselves as characters in the unfolding of history. A philosophy of the absolute.

He glorified the state. **Hegel** said the history of the world is none other than the progress of the consciousness of freedom, a progress whose development [is] according to the necessity of its nature. "If Adam had obeyed God, they would have stayed as children." **Hegel** glorified the state and felt that the end justified the means. He greatly influenced **Karl Marx**. **Hegel's** was the leading system of metaphysics during the second quarter of the 19th century.

1823 **Papal Anti-Semitism: Leo 12** required all residents of Rome to listen to catchecism, forbade Jews from owning property, and revived *Medieval* laws requiring Jews to wear distinctive clothing.

Mormonism 1823 **Religion, Mormonism: Joseph Smith** (1805-44), American, convicted for fraud in New York for claiming to be able to find treasure using *peep stones*, then said that a prophet named Mormon wrote a book on gold plates, which he gave to his son Moroni, an angel, who in September 1823, told **Smith** of the plates. (Next Mormonism 1830)

What makes things happen? Power/energy 1824 **Science: How does anything happen?** A basic question. The answer is explained by thermodynamics (the study of the transformation of energy, particularly heat, into work.). The Industrial Revolution was based to a great extent on steam engines (ref. 1712-**Newcomen**, 1865-**James Watt**, 1780-Industrial Revolution, 1798-Count **Rumford**, and 1804-**Richard Trevithick**). **Rumford** had in 1798 discovered that heat was not a substance called caloric but was the internal thermal energy of a body, nothing more or less than the agitation of atoms or molecules in solids, fluids, and gasses.

Nicolas Léonard Sadi Carnot (1796-1832), a French military engineer, developed a preliminary science of heat. that specified limits on the maximum efficiency that any heat engine can obtain. It states that all heat engines operating between the same two thermal or heat reservoirs can't have efficiencies greater than a reversible heat engine operating between the same reservoirs.

Steam engines Overview, Thermodynamics: Steam engines transformed the economic and social

- redid society** structure of England. In the 1800s, 500 of **Watt's** steam engines were operating. They pumped water from mines making the mines viable. They powered looms in textile mills. They powered ships and trains, all increasing manufacturing and trade. As **Carnot** said, engineers saw that the maximum efficiency of a steam engine depended *solely* on the difference between the hottest steam and the coolest water.
- 1824 **Sadi Carnot** The field of thermodynamics developed out of a desire to increase the efficiency of early steam engines. Thermal energy will transfer from a warmer body to a cooler one until they are both the same temperature. **Carnot** showed that in converting energy from one form to another some energy is lost into the heat sink of space. This lost energy is called entropy. This statement became the Second Law of Thermodynamics (1848 '50). The first *Law of Thermodynamics (Conservation of Energy)* was expressed in 1841, ("In an isolated system energy can not be created or destroyed." See 1841).
- Mankind's intellectual division** **Jefferson** wrote, "Men by their constitutions are naturally divided into two parties:
1. Those who fear and distrust the people and wish to draw all powers from them into the hands of the higher classes.
2. Those who identify themselves with the people, have confidence in them, cherish them and consider them the most honest and safe, although not the most wise depository of the public interest."
- 1825 **Factory life was brutal** Technology: The Erie Canal opened, connected America's heartland with the Atlantic. It vastly increased the nation's prosperity. The Industrial Revolution produced a vast amount of trade goods, but at a social price. English factory laborers worked in overheated poorly ventilated mills for long hours at pitiful wages. They lived crowded in miserable tenements, surrounded by filth and disease. Women and children were particularly mercilessly exploited. Clergy, Catholic and Protestant, identified with the upper classes, and ignored the working and living conditions of their laity.
- The clergy ignores the poor**
- Robert Owen** Humane capitalism: Robert Owen (ref 1813) and a few investors bought a cotton mill and town in New Lanark, Scotland. Profits above 5% went to improving working and living conditions.
- a humane capitalist** He built cooperatives that sold goods at a fair price. He established a pension system, built a community nursery and a school. Moral training was emphasized. He favored child labor laws, education for children. He said, "All the religions of the world are based on total ignorance of the fundamental laws of humanity. Finding that no religion is based on facts and cannot therefore be true, I began to reflect on what must be the condition of life mankind trained from infancy to believe in errors."
- No religion is based on facts**
- Owen Quotes** The churches "can no longer be maintained except through the ignorance of the mass of the people and the tyranny of the few over the mass." He felt that the preaching of churches put the blame for the ills of society on the people rather than on defective social arrangements. Owen was a lone voice. Factory owners went their way and became richer. The gulf between the rich and poor grew. There were many food riots between 1810-50.
- Owen was a lone voice**
- 1826 **Math: Nikolai Lobachevsky** (1792-1856) Russian mathematician, developed a non-Euclidean geometry, a fundamental discovery that **Einstein** used 80 years later in his *Theory of Relativity*.
- British universities: London University was founded. It admitted non-Anglicans. Until then, England had only two universities, Oxford and Cambridge. (Scotland had four). England did have "academies" or "Mechanics Institutes" for non-Anglicans, whose standards equaled or bettered Oxford or Cambridge, who taught mostly classical subjects.
- 1826 **Religion, Jefferson's last letter:** "May [our independence] be to the world, what I believe it will be, to some parts sooner, to others later, but finally to all, the signal of arousing men to burst the chains under which monkish ignorance and superstition had persuaded them to bind themselves, and to assume the blessings and security of self-government." He died.
- 1927 **Joseph Smith,** **Joseph Smith,** (1805-44) (ref 1923), in Manchester, NY said an angel named Moroni told him where to find the golden plates that the Moroni's father, the Prophet, Mormon had written on. He reputedly retrieved them and from behind a curtain dictated the Book of

- Mormonism** *Mormon* purportedly from the plates. He could read but not write. He allowed no one to see what he was reading from. Scholars have found numerous passages which appear to be copied from the *Bible*. Moroni reputedly took the plates back when he finished the book. **Smith** claimed that his religion was returning to the original teachings of **Jesus**. (More Mormonism 1830, '48, '90, 1978)
- 1827 **Brownian motion** Physics, microbiology, *Brownian motion*: Robert Brown (1773-1858), Scot, a well regarded botanist, saw that tiny grains of pollen suspended in water continued to move no matter how long the water stood. (Lucretius had said this in 58 BC in *On the Nature of Things*.) This phenomenon became known as *Brownian motion*. Its cause, vibrating molecules, was not determined for 50 years.
- 1828 **Noah Webster** (1758-1843) (ref.1783, 1806), published *An American Dictionary of the English Language*, 70,000 words, 12,000 more than any other dictionary. His name became synonymous with dictionary.
- A downside of capitalism** **Social criticism: Anne Newport Royall** (1769-1854), a widow, the first professional female journalist, newspaper publisher, travel writer, social activist, published *Black Book*. It ridiculed the missionaries who swarmed across America raising money, often from the poorest and most superstitious people. She wrote about the exploitation of women and children by factory owners. She lobbied Congress for separation of Church and state and against a reverend Ezra Stiles, who was campaigning for Americans to elect only Protestants to government. She criticized the religious rituals at West Point. "The last thing that the ruling classes want is the separation of church and state."
- Organic chemicals don't need a "life force"** Chemistry: Friedrich Woehler (1800-82), German, accidentally synthesized urea, an organic substance, from inorganic ammonium cyanate, proving that an organic substance (plants and animals) did not need a "vital force" to be formed. Little notice was taken of it. Organic chemistry is basically the chemistry of carbon. He was one of first to isolate aluminum and beryllium.
- 1828-29 Slavery, the abolitionist movement: Due to criticism for owning slaves, the Jesuit fathers of Georgetown Univ. sold, not freed, their 228 slaves to a slave owner in Louisiana. Georgetown was not unique. Many religious institutions at the time owned slaves. In 1829, North Carolina outlawed importing or distributing any writing which would tend to excite dissatisfaction in [Negroes'] minds.
- 1829 Fearing an Irish revolt, Parliament repealed some laws against Catholics, but raised the property level needed to vote to keep poor Catholics out. Catholics had to tithe to the Anglican Church.
- 1830 **Book of Mormon** Mormonism is born: Joseph Smith (ref. 1823) published *An Account Written by the Hand of Mormon upon Plates Taken from the Plates of Nephi*. It is a sacred text of the Latter Day Saints movement, which adherents believe contains writings of ancient prophets who lived on the American continent from 2200 BC to AD 421.
Most phrases were copied from the *Bible*. The biblical phrase "and it came to pass" appears over 2,000 times. **Smith** said that virtually all Christian doctrine developed after **Jesus** was false.
- Mormon beliefs** **Smith** said that a Jewish lost tribe came to America around 600 BC and became American Indians, that God married his goddess wife, that homosexuality is evil, that God sent fiery flying serpents to bite people, that God will force people to eat their own flesh, that God was once a man on another planet, that God gave Indians dark skin as they turned away from him. There is no salvation outside Mormonism. Jesus is both the Son of God and the Father. God resides on or near a planet or star named Kolob,
- Mormon beliefs: Indians are filthy and loathsome** White Supremacy: Mormon men have a chance to become a god someday. People begin as spirit children of God and his wife, a process then gave a spiritual form to an eternal intelligence. After they were spirit children, then they become babies the normal way. There are different heavens for persons of different degrees of holiness. Blacks couldn't become Mormon priests.
The Book of Mormon says Indians are filthy and loathsome. God curses one who marries an Indian. Mormons were not alone in mistreating Indians. All European-Americans cheated, slaughtered, and denied basic human rights to Native Americans throughout American history.
- Jesus?** While it purports to have been written several centuries before **Jesus**, **Smith** mentioned him often. He also mentioned Indians's horses and wheeled carts which Indians didn't have before 1492. **Mark Twain** (ref. 1847,'70): the book is an insipid mess, "Chloroform in print." (More Mormonism 1839)

Principles of Geology	1830 <u>Geology</u>: Sir Charles Lyell (1797-1875), a baronet, Scot, wrote <i>Principles of Geology, Being an Attempt to Explain the Former Changes of the Earth's Surface, by Reference to Causes Now in Operation</i>, three volumes, a history of geology and a <u>description of the inorganic physical processes at work in the world, such as volcanoes, erosion, and earthquakes.</u> It built on John Playfair's 1802 version of James Hutton's 1795 book <i>Illustrations of the Huttonian Theory of the Earth</i>. Its main theme was that everything that happened in the past is explained by events still going on but of course very slowly, <i>uniformitarianism</i>. 1830 This contradicted the prevailing theory of catastrophism (1795). Lyell suggested that Earth may be millions of years old. <u>He made no mention of life evolving.</u> The Earth evolved. (More Lyell 1832)
Species emerge from prior species	<u>Biology, evolution</u>: Diderot's d'Alembert's Dream (written in 1769) was published. He said that <u>all species emerged from prior forms</u> over eons and that there were only two kinds of certain knowledge, one's existence (Descartes) and the truths of math.
By The People	<u>Political Theory</u>: Daniel Webster (1782-1852), Senator, a founder of the American Whig Party, said, "The people's government [is] made for the people, by the people, and answerable to the people."
Auguste Comte. Positivism	1830-42 <u>Philosophy</u>: Auguste Comte (1798-1857), French, a philosopher of science, the "father of sociology (a word he coined) and <u>positivism (new name for empiricism), which recognized only positive facts and observable phenomena without inquiry into ultimate origins.</u> He wrote <i>Cours de philosophie positive / Course in Positive Philosophy</i>, six volumes 1830-42, his manifesto for <i>positivism</i>. He <u>described all natural and philosophical theology as theodicy.</u> He defined positivism the "religion of humanity" to replace "provisional government of God." In his scheme there was no place for a god.
Cours de philosophie positive	He said real knowledge must be based on observed facts. All branches of knowledge goes thru 3 stages. 1. theological / fictitious, people believed whatever they were taught, believed in a supernatural power. 2. metaphysical/abstract, the stage of investigation, the justification of <i>universal rights</i> above any, and 3. scientific / positive, which came into being after the failure of the revolution and Napoleon and Man in positivism could find solutions to social problems. Using mathematics to determine the most precise science, he named astronomy, then physics, chemistry, biology, and last, sociology. (Lester Ward). Compte considered sociology the greatest science which would include all other sciences. Knowing physical sciences, like physics and chemistry had to precede knowing the social sciences (sociology).
One single contrary fact falsifies a doctrine	Compte <u>proposed the most fully developed scheme to bring order and progress to society.</u> He said, use quantitative data to make decisions. Also, "Religion is an illusion of childhood, outgrown under proper education." Ideas govern the world, or throw it into chaos, in other words, that all social mechanism rests upon opinions. He said anthropology was the true science of man. He advocated studying the history of science. Later, with John Stuart Mill, he developed a "religion of humanity." Mill: <u>One single well-established fact, clearly irreconcilable with a doctrine, falsifies the doctrine.</u> (Huxley repeated this in 1859)
The Trail of Tears	1830-50 <u>Indian Removal</u>: Gold was found on Cherokee land in Georgia. So, from 1830-50, the US Government forced 50,000 Cherokee, Chicksaw and other tribes to walk 1,200 miles from their homes in the South to arid lands in the West to make Georgia land available for settlers. 6,000 died. Corruption ruled.
	1831 <u>Philosophy</u>: Samuel Taylor Coleridge(ref. 1798) Brit, "He who begins by loving Christianity better than the truth, will proceed by loving his own sect or church better than Christianity, and will wind up loving himself best of all."
Natural selection before Darwin	<u>Biology, evolution</u>: Patrick Matthew (1790-1874), Scottish arborculturalist and fruit grower, published a fully formed concept of Darwin's 1859 natural selection as a brief note in an appendix to his book, <i>Naval Timber and Arboriculture</i>. Darwin politely acknowledged it in 1859.
Cells have a nucleus	<u>Biology, cells</u>: Robert Brown (ref. 1827), with a microscope, saw the control point of a cell, called it the nucleus, identified its structure as existing in all plant cells, <u>a find as important as the later discovery of the atom's nucleus.</u> Nuclei were soon discovered in animal cells.
Full Electro-	1831 <u>Physics, electricity</u>: Faraday (ref. 1821) showed that changing electric currents in one

**magnetism
Timeline,
pp. 422-31**

circuit induced currents in a neighboring circuit. After hundreds of experiments, he showed that they can all be explained by the idea of changing magnetic flux. No math, just picture thinking using his field-lines.

**Foundation of
electric
motor
technology**

He produced electricity by pushing and pulling an electric coil through a magnet, i.e., *electromagnetic induction* (adding or subtracting electrons to a body), the foundation of electric motor technology. He posited that a magnetic field is composed of *lines of force* and the insight that electrical and magnetic actions are not transmitted instantaneously.

He also discovered electrolysis. (Electricity became the most useful form of energy. Easy to produce, cheap to transmit, clean, no smell, convenient, versatile.)

**Law of
Conservation
of Energy**

This established that magnetism could cause motion (pulling magnets around an axle). Then he showed that magnetism could affect light and proved that vibrations of metal could be converted into electrical impulses, crucial for the telephone. He helped create the concept of energy. A *type* of energy can change, i.e., light to heat, but the total amount of energy remains the same. (Some is lost into space.) This became the *Law of Conservation of Energy*. (See 1710 for types of energy.)

Biology: Charles Darwin (1809-82) (ref. 1779, 94, 98) well-to-do, studied medicine at Edinburgh, where professor **Robert Grant**, an evolutionist and naturalist, taught.

He graduated from Cambridge with a degree in theology, spent 1831-36 on the British surveying ship, the Beagle, sailing the South Atlantic and the South Pacific, then west around South Africa back to England, collecting specimens and making notes.

The plan was to find new minerals, plants and animals and send them back to his Cambridge botany professor, **John Henslow**, to classify in **Linnaeus's** system. **Henslow** gave him *Vol. 1* of **Lyell's** 1830 *Principles of Geology*. **Darwin** spent 3+ years on land, 18 months at sea.

**Different
species on
islands**

On the Galapagos (turtles) islands, **Darwin** saw finches on islands where their diet was seeds had short stout beaks and finches on islands where they had to burrow into crevices to find food, had long narrow beaks. This showed him that species over eons evolved to meet local conditions. Not on purpose of course. Just the finches whose beaks helped them to survive best in local conditions survived the most.

**Tierra del
Fuego**

On the southmost tip of South America, *Tierra del Fuego* (Land of Fire), he saw natives. They "were like animals, foul, naked, snuffling things with no inkling of the divine." He decided that the environment molds persons. The Fuegians had evolved so completely they could bear the cold naked. They did have fires, visible to passing ships (hence *Tierra del Fuego*.)

**1832
Vol. 2 of
Principles
of
Geology**

Biology, botany: Charles Lyell's Vol. 2 of Principles of Geology (ref 1830) described processes like a change in the climate might cause species to appear or disappear. **Lyell** theorized that changes in plants and animals might be due to their isolation in separate and different ecological circumstances. Regarding fossils, he wrote, "In the universal struggle for existence, the right of the strongest eventually prevails." (Survival of the fittest?) This destroyed Genesis's creation story.

Darwin also read *Volume 2 of Lyell's Geology*. It was sent to him during his voyage, with its speculation that changes in plants and animals may be due to their isolation and the question whether species die and others take their place. (more **Darwin** 1837, '44, '55, '58-60, '62-64, '71)

Lyell was referring to competition among *different species*, as he had seen from fossils that various *species* had died out, as opposed to **Darwin's** developing theory of *Natural Selection* relating to competition *within* a species. **Lyell's Vol. 3** (1833) said the Earth must be millions of years old to have created the present world. The Anglican Church of course strongly opposed **Lyell's** theory of the "extreme" age of the Earth. So he was ostracized by Anglicans, but became famous.

1832 **Goethe** published *Faust Part 2*, the world to come. Progress, ruthlessness, the old destroyed. He died.
Male supremacy: In England, Men over 21 who owned property were allowed to vote.
The Ohio and Erie Canal linked Akron (central Ohio) to Lake Erie near Cleveland.
The Delaware Canal linked Delaware Bay to the Chesapeake Bay.

1832-34 War: Karl von Clausewitz (1780-1831) a career Prussian general, wrote *Vom Kriege / On War*, three volumes, published (after he died). He was the first to formulate the modern concept of total war, with large armies. He considered war an extension of policy, to totally destroy one's enemy's armed forces.
He said, "War was an unceasing act of utmost violence." "Defense is the stronger form of making

Brutality works	war, not passively, but luring your enemy into your land, lengthening his supply lines, as Russia did with Napoleon , and then destroying his will to fight. Morale was crucial." "It is a waste—and worse than a waste—to ignore the element of brutality because of the repugnance it excites."
1833	<u>Political Theory, nationalism</u> : Leopold von Ranke (1795-1866), German historian. "God said <u>every nation has a special moral character; one should strive to fulfill the <i>idea</i> of that state.</u> " He said, "Germans, reject the French revolution. Every age is unique, should be judged in its own context."
Slaves	England had banned the slave trade in 1808. <u>England freed all slaves</u> in its dominions, except India. England compensated their owners including the Bishop of Exeter, who co-owned 665 slaves.
Admit Jews to Parliament. Puritans couldn't stand people being happy	<u>Lord Thomas Macaulay</u> : (1800-59) (ref. 1778), Brit. historian, statesman. "In the infancy of our civilization, when our island was as savage as New Guinea. . .[the Jews] had their fenced cities and cedar palaces, their splendid temple, their fleets of merchant ships, their schools of sacred learning, great statesmen and soldiers, their natural philosophers, their historians and poets. Let us open to them the House of Commons." Macaulay said <u>American "Puritans hated bear-baiting not because it pained the bear, but because it gave pleasure to the spectators."</u> "What are laws but the expression of the opinion of the class with power over the rest of the community?" (more 1850)
The greedy rich steal.	<u>Political Theory, social classes</u> : George Bancroft (1800-'91), American historian, social critic, "Show me one instance where popular institutions have violated the rights of property (i.e., the wealthy), and I will show you a hundred, nay a thousand instances where the people have been pillaged by the greed of a privileged class."
1834 PV = nRT ideal gas	<u>Physics, chemistry</u> : Emile Clapeyron (1799-1864) French engineer and physicist, combined Boyle's Law (1666) (volume/pressure inverse relationship), Charles's insight (heat causes expansion), Avogadro's Law (all gas molecules same size) , and Gay-Lussac's law (when gases combine, their volumes have small whole-number ratios) into the <i>ideal gas law</i> : $PV = nRT$. (P = pressure, V = volume, T= Kelvin temperature, R = ideal gas constant, n = number of moles of gas). Note use of the term <i>ideal gas</i> . The product PV, while nearly constant at a given temperature, does vary slightly with the pressure. So physicists postulate an imaginary <i>ideal gas</i> , which <i>by definition</i> obeys Boyle's law exactly at all pressures. Real gasses at low pressure become very close to "ideal" gasses.)
1835-40 Americans like money, change, and Christianity.	<u>Political Theory, sociology</u> : Alexis Charles Henri Clérel, Comte de Tocqueville (1805-59), a young French nobleman, traveled around America mainly to study its democracy, which he considered the wave of the future. He wrote <i>De la Démocratie en Amérique / Democracy in America</i> (4 vols), saw clearly that progress toward equality was irresistible, saw the importance of public opinion, the need to regulate large industries, the power of the press as "the main democratic instrument of freedom," and the difficulties to attract good government officials.
Tocqueville: America has little independence of mind and real freedom of discussion	"I know of no country where the love of money has taken stronger hold on the affections <u>of men</u> and where a profounder contempt is expressed for the theory of the permanent equality of property." "America is a land of wonders, in which everything is in constant motion, and every change seems an improvement." "There is no country in the world in which the Christian religion retains a greater influence over the souls of men." "I know of no country in which there is so little independence <u>of mind</u> but has real freedom of discussion as in America." (A mixed compliment to Americans.)
He denigrated Islam	Though a nobleman, he saw that the privileges of nobility in Europe had to end and nobles had to adapt to it. <u>He denigrated Islam</u> , "There have been few religions in the world as deadly to men as that of Mohammed , the principal cause of the decadence so visible today in Islam, its social and political tendencies are in my opinion to be feared, and I therefore regard it as <u>a form of decadence rather than a form of progress</u> in relation to paganism itself."He also covered the danger of majority tyranny and how religion and morality helped support democracy.
1836-'82 Emerson influenced the American character	<u>American culture, philosophy, transcendentalism</u> : Ralph Waldo Emerson (1803-82), left his work as a Unitarian minister as he did not think that the Lord's Supper had a place in Utilitarianism. He <u>decided to make a living giving lectures</u> . He spent most of his life traveling around the US and abroad, becoming famous and influential, lecturing on subjects

Self-Reliance & his essays	like friendship, character, manners, intellect, and politics. In his lifetime, he gave over 1,500 lectures. <u>He founded <i>Transcendentalism</i> ("an ideal spiritual state transcending the physical and empirical."</u> Also, "relating to a spiritual realm beyond the realm and reach of the senses. " Also, "exalted character, thought, or language") his answer to Utilitarianism.
His overall idea was the <i>Over-Soul</i>, a force animating all mankind	He became one of the utmost influential figures in American history. He published collections of his essays every few years. His most famous was <i>Self-Reliance</i> , Millions of copies were printed. <u>The common theme of his lectures and his essays was optimism, confidence and faith in one's ability to control the universe and to develop beauty, freedom, friendship, and peace.</u> His overall idea was the <i>Over-Soul</i> , a force animating all mankind, from which the race derives every revelation of truth, beauty, wisdom, and virtue.
Emerson Quotes	<u>"Man is timid and apologetic; he is no longer upright; he dares not say, "I think, I am, but quotes some saint or sage. He is ashamed before the blade of grass or the blowing rose.</u> These roses under my window make no reference to former roses or to better ones; they are for what they are; they exist with God today. There is no time to them. There is simply the rose; it is perfect in every moment of its existence." "The religion that is afraid of science dishonors God." .
Beware when the great God lets loose a thinker on this planet	<u>"A foolish consistency is the hobgoblin of little minds."</u> "All history is but the lengthened shadow of great men." <u>"There is no history, only biography."</u> "The faith that stands on authority is not faith." "When believers and unbelievers live in the same manner, I distrust the religion." <u>"Beware when the great God lets loose a thinker on this planet. Then all things are at risk."</u>
Conservatives are such by personal defects.	<u>"If one owns land, the land owns him."</u> <u>"Character is higher than intellect.</u> But people postpones or remembers; he does not live in the present, but with reverted eye laments the past, or, heedless of the riches that surround him, stands on tiptoe to foresee the future." " He cannot be happy and strong until he too lives with nature in the present, above time." "Leave this hypocritical prating about the masses. The masses are rude, lame, unmade. Pernicious in their demands and influence, and need not be flattered but schooled."
Men in power may be bought cheap	<u>"All conservatives are such by personal defects.</u> They have become effeminated by position of nature, born halt and blind, through the luxury of their parents, and can, only like invalids, act on the defensive." <u>"Men in power have no opinions, but may be had cheap, for any opinion, for any purpose."</u> His lectures inspired millions. <u>He was a true American treasure.</u>
A true American treasure.	<u>Emerson advocated reform in religion, education, and politics.</u> His influence on the American and European mind and character cannot be overstated. Matthew Arnold , Oxford professor, literary critic, said <u>Emerson's essays were the most important work done in prose in the 19th century.</u> <u>Untold numbers of American babies were named Ralph Waldo.</u>
McGuffey's Readers also moulded the American character	American culture: William Holmes McGuffey (1800-73), a prominent educator, wrote <i>McGuffey's Readers</i> , the most popular school books ever. 122 million copies were sold by 1900. They were well illustrated, <u>inspiring <i>Horatio Alger</i> type stories,</u> emphasizing honesty, a strict ethical code, thrift, respect for property, religion, patriotism. His books were easy reading. Like Emerson , he was <u>as influential as the <i>Bible</i> in molding American thinking.</u>
	Russian Culture: Alexander Pushkin (1799 1837), a great Russian poet, published <i>The Captain's Daughter</i> , the first novel of Russian realism, based on real events. As Crown Historian, he had access to the private papers of Catherine 2 and state archives. An adventure and love story.
1836 John Stuart Mill	Philosophy: John Stuart Mill (1806-73), Brit, likely <u>most important 19th century English speaking philosopher,</u> intensely home schooled by his father, philosopher James Mill , (read Latin at three, Greek at eight), godson of Jeremy Bentham (ref.1789), he became an <u>advocate of <i>Utilitarianism</i>.</u> But, he felt that "happiness for the greatest number," leaves some people without benefits. So he devised a scale of values, with freedom at the top. For Bentham's "greatest number," he substituted a universal category, the individual. But said that an individual's liberty was not absolute.
The Design Argument solves a mystery with a bigger	<u>Mill critiqued the <i>Design Argument</i>.</u> He asked, "If complexity requires a creator, who created God?" and replied, "This is perhaps the greatest problem with the idea of complexity by design. Invoking a deity doesn't solve the problem of complexity; it introduces a new problem. If all complex things really do require an intelligent creator, then why is that creator himself

- mystery.** not bound to the same rule? Would that complex deity not require an even more complex creator, and so on, for infinity? You cannot solve a mystery by invoking a bigger mystery."
- He said, "The principle itself of dogmatic religion, dogmatic morality, dogmatic philosophy, is what is required to be rooted out; not any particular manifestation of that principle."
(In 1874, **Mill** stated another kind of critique the *Design Argument*). (more **Mill** 1859, '74)
- 1837 **Disraeli** **Quotes** Political Theory, civil rights: Benjamin Disraeli (1804-81), became an MP of the Conservative party, then Prime Minister (1868-70 and '74-80). **Victoria** made him **Earl of Beaconsfield** in 1876.
He said, "All power is a trust . . . We are accountable for its exercise. . . From the people, and for the people, all springs, and all must exist." "Property has its duties as well as its rights."
"A Conservative Government is organized hypocrisy." "What art was to the ancient world, Science is to the modern." Also, "To tax the community for the advantage of a class is not protection; it is plunder." "To be conscious that you are ignorant is a great step to knowledge." (So said **Socrates**)
- 1837 In Illinois, A pro-slavery mob murdered abolitionist journalist & Presbyterian minister **Elijah Lovejoy**.
- 1837-39 **Darwin** **back in England,** Biology: Darwin (ref. 1779, '94, '98, 1831-32) returned to England. His reports and specimens sent from abroad had been published and made him a well regarded naturalist and geologist. He became Secretary of the *Geological Society*. He joined the *Royal Society* and other scientific societies.
He read widely preparing his notes for publication, talked to expert breeders of animals, studied skeletons of domesticated and wild birds. He saw how farmers drastically changed the characteristics of livestock through selective breeding. Socially, he was a staunch abolitionist.
In 1838, Darwin read Malthus's 1798 Essay on Population (Population increases more rapidly than the food supply. So there is always a struggle / competition for food). He began to think the same changes that farmers made through selective breeding could simply come about naturally, particularly after reading **Malthus**. In 1839, he published *Journal and Remarks* on the geology, botany, and zoology that he saw on his trip. He continued to publish scholarly articles on biology, botany, and principally geology, his specialty. (more **Darwin** 1844, '55, '57-62, '71, '76, 1900, '07, '72)
- Journal and Remarks**
- c.1838 Physics: Louis Daugerre (1787-1851) French, developed a practical method of photography.
Dominique Arago, minister of war & marine, abolished slavery in French colonies.(more **Arago** p. 423)
- 1838 Political Theory: Thomas Drummond (1797-1840), Scot, "Property owners have duties as well as rights."
- One light year is 5.88 trillion miles** Physics: Frederich Bessel (1784-1846) measured the distance to the star *61 Cigni*. (also p. 434) by triangulation, deduced it was 58.8T miles, i.e., 10 light years away.
(A light year is how far electromagnetic waves like sunlight travel in a year, 5.88T miles.)
He also measured other stars and saw that heat properties like temperature and chemical composition of stars and the Sun were alike; so our Sun is a star.
- 1839 **Mormons** Religion, Mormons were forced west: Joseph Smith gained followers. Four of his 35 or so wives were 14-16, some others already married. Christians persecuted them He and his followers were hounded out of New York State. They went West to various towns in Ohio and Missouri.
They met opposition everywhere. In 1839, they purchased a small town in Illinois, renamed it Nauvoo and began to build a Temple. Nauvoo became the church's new headquarters. It grew rapidly, with immigrants from Europe. **Smith excommunicated** most of his original followers.
In 1844, a Christian anti-Mormon mob killed **Smith. Brigham Young**, with several wives, then led **Smith's** followers to Utah, then part of Mexico. (more Mormonism 1848, '90, 1978)
- 1839-1876 **Some Turks saw Islam was stagnating** Islam, tanzimat / Modernization of the Ottoman Empire: The Ottoman Empire was shrinking and deteriorating. Turkish reformist sultans **Mahmud 2** and **Abdul Mecid** and some European-educated bureaucrats, principally Turkish, influenced by the *Enlightenment* in Europe, saw the Islamic culture was preventing economic/social progress. They sought to modernize their empire to save Islam.
- The Tanzimat modernized Turkey** They instituted many basic reforms Specifically: they restricted Muslim *Shari'a* law to family matters, established a parliament, a *Land Code*, a telegraph service, railways, equal legal rights for non-Muslims, schools to train government workers, a postal service, modern universities, a *Commercial Code*, a national anthem, a Ministry of Health care, European style courts, an Academy of Sciences, a School of Economic and Political Sciences, a stock exchange, a Central Bank, reorganized the finance system and the *Civil and Criminal Codes* to the French model, reorganized

the Army, took a census (male citizens only), issued identity cards, and abolished slavery.

It was a foreign influence, Conservative Muslims fought the modernization as a “foreign influence” on *Islam*, thinking that that ended the argument. This is the usual tactic of authority figures against anything that would disturb their power and authority. Of course it was a foreign influence. The relevant question is, is the foreign influence beneficial or detrimental? Answer: Turkey became the most advanced Muslim country. (In 1876, a new constitution was adopted that, *inter alia*, checked the sultan’s power.).

Southern states forbade teaching Blacks to read, write :Psychology, White fear of educated Blacks: From 1740 to 1834, All Southern states had laws outlawing teaching Negroes to read or write. Across the South there were laws restricting Blacks from suing, traveling, and other activities. The White “gentry” even opposed public schools for poor Whites. The South Carolina legislature (White property owners) even prohibited poor Scots-Irish farmers in the uplands from taxing themselves for schools. Only 10-16% of Southern White children had public schools. Blacks none.

1840 Geology, glaciers: **Jean Louis Rudolphe Agassiz** (1807-73) Swiss American, anti-Darwinist, published *Etudes sur les Glaciers/Studies on Glaciers*. It said ice once covered the world as far south as Switzerland with glaciers that had carried huge boulders onto flat land beyond current mountains.

Socialism 1840 Political Theory, socialism: **Pierre Joseph Proudhon** (1809-65), was an early leader of French socialism and strong critic of capitalism. He opposed an all powerful state in favor of individual freedom. He published *Qu’est que la Propriete ou Recherches sur le Principe du Droit et du Gouvernement / What is Property or an Inquiry into the Principle of Right and of Government*.

Proudhon Quotes He coined “anarchism,” (a society based on the principle of reciprocity.) Said, “Slavery is murder. Property(except for one’s own use) is theft.” Legal ownership without the responsibilities which went with it is a theft from those who actually work the land.”
Property is theft Also, “Communism is inequality.” “Everyone has a right to as much property as he needs for his actual production and his heirs can keep it as long as they use it for their production to live.”
“There should be no private property that creates and maintains social inequality.”

Thermodynamics applies to chemical reactions 1840 Chemistry: **Germain Henri Hess** (1802-50): Swiss Russian chemist and professor, published his most notable paper, outlining his law on thermochemistry. His principle originated the first law of thermodynamics (now known as **Hess’** law or *the law of constant heat summation*).
It states that in a series of chemical reactions, the total energy gained or lost depends only on the initial and final states, irregardless of the intermediate steps. The amount of heat developed or absorbed in a chemical reaction was always fixed, so the *laws of thermodynamics* also applied to chemical reactions. It started the science of thermochemistry. (More below)

First law of Thermodynamics: Conservation of Energy. 1841 Thermodynamics: **Julius Robert von Mayer** (1814-71), German doctor and physicist, was the first to suggest the *Law of Conservation of Energy*. He saw that, in an isolated system, the total mechanical energy of objects that interact with each other remains constant. Work (the expenditure of energy) and heat, although different forms of energy, can be transformed into one another.
This idea soon became the First Law of Thermodynamics (see 1843 and 1847-Helmholtz).
Mayer said that the source of all energy was the radiation of light and heat from the Sun. (Radiant energy, light, heat, radio waves), that oxidation was the primary source of energy for any living cell. His paper was rejected by the prestigious journal, *Annalen der Physik*. (See 1843-**Joule**). He was first person to say oxidation was the primary source of energy for any living cell. (See 1785-**Lavoisier** and 1860-Cell)

Wm. Whewell, Brit, coined the words *scientist, physicist, ion, cathode, consilience, and uniformitarianism*.

Morality based on religion allows injustice. 1841 Philosophy: **Ludwig Feuerbach** (1804-72), Bavarian, criticized **Hegel’s** idealism regarding the German nation. “When morality is based on theology, and right is made dependent on divine authority, the most immoral, unjust, infamous things can be justified and established.”
“God is a human invention.” He wanted to transform the friends of God into friends of men, believers into thinkers. Regarding an unknowable God, he said, “To deny all qualities of a being is equivalent to denying the being himself.” “Belief in God is nothing but the belief in human dignity.”

On Heroes, Hero-worship, the Heroes in History 1841 Philosophy, The Great Man Theory of History: **Thomas Carlyle** (1795-1881), Rector, Univ. of Edinburgh, published *On Heroes, Hero-Worship, the Heroes in History* and *Nigger Question*.
Namely, “The history of what man has accomplished in this world, is, at bottom, the history of the great men who have worked here.” “They need not be kings.” He picked as

A higher kind of reason?	examples Odin of Scandinavian mythology, Mohammad, John Knox, Dante, Shakespeare, Samuel Johnson, Rousseau, Robert Burns, Cromwell, and Napoleon.
Science doesn't explain reality. There's a higher kind of reason than science.	He said that science is an acceptable activity but not adequate to explain reality. He contrasted scientific reason to a <u>higher kind of reason</u> , said, " <u>The greatest law of culture is to let each person become all that he was created capable of being; to expand, if possible to his full growth.</u> " Carlyle said, " <u>The three great elements of modern civilization are gunpowder, printing, and Protestantism.</u> " He had no faith in the democratic theory of human equality before the law. He also said the <i>Qur'an</i> was "wearisome confused jumble, crude. . . . stupidity." Referring to <u>Islam</u> , " <u>I do not believe in the collective wisdom of individual ignorance.</u> "
Doppler effect	1842 <u>Physics, Sound waves</u> : Christian Johann Doppler (1803-53), Austrian, noticed that <u>an approaching sound source has a higher pitch (higher frequency / more waves per second) to man's ear than the sound from a stationary sound source.</u> He deduced that it was because approaching sound waves bunch up. He similarly discovered that a departing sound source has a lower pitch as <i>receding</i> waves spread out. So this is the Doppler Effect .
Speed of sound	Sound goes through air (at sea level and 0 centigrade) at c768 mph, through water 4.3 times faster, and through steel 15 times faster). <u>Sound waves are mechanical waves, not electromagnetic waves.</u> Even so, Doppler predicted that <u>electromagnetic waves would follow the same principle.</u> He was right. In 1848, Hippolyte Fizeau confirmed it. (See 1848- Fizeau).
	1842 <u>Medicine</u> : Edwin Chadwick , Brit, <i>Poor Laws</i> reformer, proved by extensive documentation that poor sanitation and polluted water cut life expectancy by a decade. Gentry's life expectancy was 43, a laborer, 22. <u>Justice</u> : G J Holyoake , Brit, social reformer, jailed for six months for saying he didn't believe in God.
	1843 <u>Physics, Thermodynamics</u> : James Joule (1818-89) Brit, physicist, mathematician, brewer, Like Mayer (1841), he studied heat and discovered its relationship to mechanical work. This also led to the <i>Law of Conservation of Energy</i> , which led to the <i>First Law of Thermodynamics</i> . (See 1847) Joule determined the <u>relationship between the current through a resistor and the heat dissipated.</u> He showed that <u>a specific quantity of heat can be equated to a specific quantity of mechanical work.</u> i.e., "The amount of heat produced in an electrical circuit is proportional to the time duration times the resistance and the square of the current passing through it." <u>This is Joule's first law.</u>
Thermodynamics	<u>This new mechanical equivalence of heat started the study of thermodynamics.</u> Like Ohm's Law , (ref. 1826), it expresses a special property of certain materials rather than a general property of all matter. Joule also worked with William Thomson (later Lord Kelvin) to quantify absolute zero, which came to be called the Kelvin scale. (Next advance in thermodynamics. 1847- von Helmholtz)
Knowledge is not understanding	<u>Philosophy</u> : Alexandre Dumas pere (1802-70), "Learning does not make one learned. <u>There are those who have knowledge and those who have understanding.</u> The first requires memory and the second philosophy." He once said to a heckler, "My father was a Creole, his father a Negro, and his father a monkey; my family it seems, begins where yours left off." His book, <i>The Count of Monte Cristo</i> tells the adventures of a man unjustly imprisoned who escapes and becomes rich (like <i>Les Miserables</i>). His love, rivals, treachery, murdering wives, a prosecutor's secrets revealed at a trial.
	1844 <u>Biology, Evolution</u> : Robert Chambers (1802-71), an English journalist, published, anonymously <i>Vestiges of the Natural History of Creation</i> . <u>All creatures, (even man), evolved from simpler creatures following God given laws.</u> It was very popular. Darwin and Alfred Wallace read it."
Natural Selection is mindless, mechanical, wasteful, blind, blundering	<u>Biology, Evolution</u> : During 1838-44, Darwin (ref. 1779, '94, '98, 1831-2, '36, '38), developed the theory of <i>Natural Selection</i> , that in Malthus's struggle for food, <u>some species die and others come into existence. And within a species, not all offspring are identical.</u> So those who are the most-fit-to-survive, because they are a modification of the species or a new species, survive and reproduce offspring with such better survivable characteristics." Daniel Dennett (1942-2024), "Natural selection is "mindless, mechanical, algorithmic process–wasteful, blind, blundering."
The struggle	Darwin said that <u>Malthus's insight that there is a constant struggle for food and not all survive</u>

for food was key to Darwinism	was his key to the issue of species change. He knew his theory contradicted scripture. His wife was devout. So he told her to publish his theory after he died. In 1844, he finished a handwritten 230 page explanation of the essence of his theory, <i>Natural Selection</i> . He told his theory to close friends including Hooker and Lyell . (more Darwin 1855, '57-62, '71, '76, 1900, '07, '72)
1844 The Bible justified slavery.	<u>Society, slavery: Frederick Douglass (1818-95), born a slave in Maryland. At 20, escaped to the North posing as a freed sailor and taking a train from Baltimore to Philadelphia. He taught himself how to read and write. He said he was a slave until he learned to pray with his feet.</u> He became a national leader of the abolitionist movement in Massachusetts and New York, and great orator and anti-slavery writer. He said <u>his condition when a slave became worse when his master underwent a religious conversion that allowed him to justify slavery as their punishment as the children of Ham.</u>
1844	He published <i>Narrative of the Life of Frederick Douglass</i> . It described the psychological effects of slavery. He was described by abolitionists as a living counter-example to slaveholders's arguments that slaves lacked the intellect to function as independent American citizens.
Skeptical Existentialism	<u>Philosophy: Soren Kierkegaard (1813-55) Dane. A devout Christian. The Father of existentialism.</u> He thought the German Idealists's claims were extravagant and adopted a more skeptical view in which universals were beyond the reach of Man. He similarly saw God as an entity. He said, "The plan/ essence for a table precedes a table's existence, but with humans, existence precedes essence. Man comes into being without a plan/essence for him until he makes one for himself."
Knowledge must precede every act	He said, "What I really need is to get clear about what I must do, not about what I must know, except insofar as <u>knowledge must precede every act</u> . What matters is to find a purpose, to see what God really wills that I shall do; <u>the crucial thing is to find a truth which is truth for me, to find the idea for which I am willing to live and die.</u> " (How should I live? Socrates's question).
1844	<u>Philosophy: In <i>Philosophical Fragments</i>, Kierkegaard wrote, "Let us call this unknown something God. It's just a name we give it. Proving this unknown exists isn't reasonable because one can't prove God <i>doesn't</i> exist. If he does exist, it would be folly to try because in trying to prove he does exist, I must <i>assume</i> he does exist, because if I assumed he doesn't, I wouldn't begin, knowing that I couldn't prove he exists if he didn't.</u> But, if when I speak of proving that God exists means that I propose to prove that the Unknown, which exists, is God, then I speak unfortunately. For then I don't prove anything, least of all an existence, but merely develop the content of a conception. [But, one doesn't necessarily have <i>to assume</i> God exists in order to try to prove God exists. "Natural theology" arguments simply examine the world and see matters that lead them to believe God exists.] Hume, Kant, and Kierkegaard all argued that one couldn't prove or disprove God.
"Natural theology" arguments don't assume God exists	
Kierkegaard Quotes	He said <u>rational arguments for God (Aquinas, Descartes) were irrelevant.</u> "Man could not know science. . . <u>Philosophy, especially, and empiricism, are vain and pointless. Only individuals matter; existence is individual in character.</u> " "If God could be rationally proven, his existence would be unimportant to humans.
the pathos of existing	<u>Christendom has done away with Christianity without being quite aware of it. As death is certain, every choice has worth, every moment is a unique occasion for decisive action;</u> each individual achieves his being through decisions. What really matters is the pathos of existing."
Kierkegaard: The tyrant dies and his rule is over	"Men leap to faith <u>when they believe something without evidence</u> (now known as the leap of faith). " <u>The tyrant dies and his rule is over. The martyr dies and his rule begins.</u> " (Ref. Jesus)
Three groups of men	"There are <u>three groups of men, aesthetes</u> , who want entertainment, <u>ethical men</u> , who live for duty, and <u>religious men</u> , who live to obey God. Suffering is necessary; the individual must stand alone against the crowd." All essential knowledge relates to existence, or only such knowledge as an essential relationship to existence is essential knowledge." "The function of prayer is not to influence God, but rather to change the nature of the one who prays."
1845	<u>Biology, botany: Darwin (ref 1831) published <i>The Voyage of the Beagle</i> describing his discoveries.</u>
1845 Cosmos Unity of	<u>Geography: Alexander von Humboldt (1767-1859) ref. 1801), then second only to Napoleon in fame,</u> put all he knew of the heavens and the Earth in a single book, <i>Cosmos: Sketch of a Physical</i>

**Science,
Nature,
and Man.**

Description of the Universe (five volumes, 1845-62), it ranged from discussing nebulae (clouds) to the to the geography of mosses. He combined the broad philosophical ideas of the 18th century with the scientific knowledge of the 19th century. It helped solidify science as the basic science of fact. His most enduring legacy was his conception of the unity of science, nature, and man.

**Cells divide,
mitosis is
2nd great
biology
discovery**

Biology: Robert Remak (1815-'65) Polish-Prussian embryologist, physiologist, neurologist, discovered that cells divide to create new cells, mitosis, the second great discovery in biology.

As a Jew, he was denied teaching positions until 1847 when he became the first Jew to teach at the U. of Berlin. (The third great discovery in biology came in 1859 when **Charles Darwin** described evolution by *Natural Selection*.)

1845 **John L O'Sullivan**, (1813-95), editor and diplomat coined the term "manifest destiny" to promote annexing Texas. "It is America's manifest destiny to overspread the continent allotted by Providence."

1845 **Philosophy: Horace Greeley** (1811-72), editorial, *NY Tribune*, "Full of error and suffering as the world yet is, we cannot afford to reject any idea which proposes to improve the moral, intellectual, or social condition of mankind." He was known for saying, "Go West, young man." (He actually may have said it.)

**1845
Secular
Judaism**

Judaism: A group of reformed rabbis influenced by **Hegel** met in Berlin to discuss reforming Judaism. Their Reformed Judaism became the largest Jewish sect. (Overtly secular Judaism became a significant group in the 20th century.) One cannot be a secular Christian or Muslim.

**1845
Stirner:
Altruists
are slaves.**

**Free men
are egoists**

Political Theory: Max Stirner (1806-56), German, founder of *theoretical anarchism*, "A race of altruists is necessarily a race of slaves. A race of free men is necessarily a race of egoists. The state calls its own violence law, but that of the individual, crime. Property exists by force of the law. Truth is the free thought, the free idea, the free spirit." "Whoever will be free must make himself free. Freedom is no fairy gift to fall into a man's lap. What is freedom? To have the will to be responsible for one's self. Freedom cannot be granted. It must be taken." "God (supernaturalism) is dead."

Socialism

1845 **Socialism: Friedrich Engel** (1820-95) was a German philosopher, historian, and revolutionary socialist. He was also a businessman and journalist. His father owned large textile factories in England and Germany. He wrote *The Condition of the Working Class in England*. their misery, despair, squalor, starvation. One third of English men and 45% of English women could not write their names.

1846 **William Morton** showed ether was an anesthesia for surgery, of incalculable benefit to patients.

**1846
William
Thomson,
professor
for 53 years**

Physics, Energy: William Thomson (1824-1907) Scot, entered Glasgow U. at 10, studied in Paris and London, Cambridge graduate, made professor of natural philosophy at Glasgow at 22, taught there 53 years, wrote 661 papers, many on pure and applied math, suggested the method that led to refrigeration. In 1846, said, "Physics is the science of force." Five years later he had revised his thinking. He wrote, "Energy is the primary principle." This change came from studies of the motion of individual particles including planets, and from masses of particles like steam engines.

**Measure,
then you
know**

**Mariner's
compass**

"When you can measure what you are talking about and express it in numbers, you know something." He invented a depth sounder, did pioneering theoretical work in electromagnetism, thermodynamics (see 1850), and the wave theory of light. He established today's standards of electrical measurement.

He revolutionized the mariner's compass and was the foremost theoretician of underwater telegraphy. He invented boosting devices for the undersea cables that allowed telegrams to be sent across oceans. He said the Earth was 24 million years old, far higher than any other scientist at the time but still way way low. (more **Thomson** 1848, '51, '53, '67, '92, pp. 426, 429, 464)

**Did the soul
evolve?
Man didn't
descend
from lower
animals**

Evolution: Hugh Miller (1802-56) Scot, lay theologian, geologist. His book, *Footprints of the Creator* reconstructed the extinct fishes he had discovered and argued, on theological grounds, that their perfection of development disproved the theory of evolution. He stated that if the "development hypothesis," i. e., evolution, was accepted and Modern humans are descended from lower forms of life (being then advocated by Lamarck and others) then it is arguable that the soul also evolved from these forms. So he said humans were not descended from lower forms of life.

Wagner

Richard Wagner, German revolutionary. He called for the peasants to rise up, destroy the old order and create a new society. After the peasants uprising of 1848-49, he was exiled to France.

c.1847
**First law:
Conservation
of energy**
*Electromagnetism
Timeline*,
pp. 422-431

Thermodynamics: Hermann von Helmholtz (1821-94) wrote *Über die Erhaltung der Kraft /On the Conservation of Force (energy)*. It stated the principle of the First Law of Thermodynamics, the Conservation of Energy, that Energy can't be created or destroyed, it can be transformed into another form. Heat and work are equivalent. *Annalen der Physik* rejected it. He printed it privately. Put another way, when X amount of energy is expended in one place, it appears elsewhere in the same system." (It could dissipate into space as entropy, heating the space it dissipates into.)

**Conservation
of energy**

He said that conservation of energy is a universal principle of nature. He posited a relationship between mechanics, heat, light, electricity and magnetism by treating them all as manifestations of a single force (energy). **Rumford** (ref. 1798), **Julius Mayer**(ref. 1841), **Joule** (ref 1843), and **Helmholtz**, all independently, studied the possible relationship between heat and energy.

**"Energy" is
the unity of
light,
electricity,
magnetism,
heat, and
mechanics**

Energy showed the underlying unity of heat, light, electricity, magnetism, and mechanics.

Heat is now called *thermal energy* and is the agitation/vibration of atoms or molecules.

Carnot in 1824 had said thermal energy transfers only from an object to a cooler one.

Thermal energy transfers by conduction, convection, or radiation. All forms of energy can be converted 100% into heat. No other conversion is 100% efficient. Some energy is lost in all other energy conversions. See 1701 for list of and definitions of types of energy, kinetic, potential, etc.

**Caveat re
thermo-
dynamics**

But, an important caveat about thermodynamics. **Steven Weinberg** (1908-2021), physicist,

"The laws of thermodynamics don't apply everywhere. (For example, to a single atom).

You have to ask whether its laws can be deduced from what you know about the system you are studying." "Thermodynamics itself is never the explanation of anything - you always have to ask how it applies to the system you are studying. You do this by deducing its laws from whatever more fundamental principles happen to be relevant to that system.

Einstein found that Euclidian geometry applies everywhere, except in gravitational fields.

1847-49

During Ireland's 1847-49 potato famine, the Brits' unofficial policy was to starve the Irish. Queen Victoria's advisor, Nassau Senior, told her that the British confiscations of Irish crops wouldn't kill more than one million. "That will scarcely be enough to do much good."

Charles Trevelyan, heading the Brits' phony "relief effort" for Ireland thought the famine an effective way to reduce Ireland's unruly Catholic "surplus" population.

1847

Medicine: Ignaz Semmelweis, Hungarian doctor in a Vienna hospital, washed his hands before delivering babies, as midwives normally did. Deaths dropped. The germ theory of disease was then unknown.

**19th Century
Social
critics:**

Many thinkers criticized the narrow-minded, hypocrisy of 19th century Western society.

Examples: **Charles Dickens** (1812-70), brought up in abject poverty, the greatest social critic of the 19th century, wrote relentlessly about the horrors of prisons and the workhouse in *Pickwick Papers* and *Oliver Twist*, the imprisonment for not paying a debt in *Little Dorrit*, and the cruel exploitation of child labor in *David Copperfield*. In *Dombey and Son*, a wealthy banker has a sickly son who asked what is money good for? The father patronized the boy,

Hypocrisy

"Money can do anything." But in the end, money could not save the boy nor the banker. Only a neglected daughter survived, whom he then saw is worth everything. **Karl Marx**, himself a great social critic, said, "**Dickens** gave the world more political and social truths than have been uttered by all the professional politicians, publicists, and moralists put together."
(More **Dickens**, 1854-**Dickens-Hard Times**)

Twain

Mark Twain, *Innocents Abroad*, In Europe he found Europeans pretentious, petty, supercilious, no dignity. (1869) And, "My mother told me that in her whole life she had never heard a sermon against slavery, but countless sermons preaching that slavery was God's will." (Actually, the *Bible* approved of slavery and so kept it morally acceptable for almost two millennia.)

Flaubert

Gustave Flaubert (1821-80) *Madame Bovary*, is a tragic novel about a woman married to a dull but decent person. Bored with the banalities of provincial life, she has a series of extramarital affairs. Her desire for passion and excitement eventually causes her financial ruin and a tragic end (1856).

Beaudelaire

Charles Beaudelaire (1821-65) critic. "If rape, poison, daggers, arson haven't yet decorated the banal canvas of our pitiable lives with their pleasing designs, it is because our souls have not enough boldness."

- Slavery** **Frederick Douglass** (ref 1844), "The existence of slavery in this country brands your republicanism as a sham, your humanity as a base pretense, and your Christianity as a lie. It destroys your moral power abroad. It corrupts your politicians at home. I prayed for 20 years. No answer until I prayed with my legs."
- Melville** **Herman Melville** (1819-91) Of all the preposterous assumptions of humanity over humanity, nothing exceeds the criticisms that the well-housed, well-warmed, well-fed make on the habits of the poor.
- Henrik Ibsen (1848)** **Henrik Ibsen** (1828-1906), most famous Norwegian, but so hated by the conservative middle class "moral" people of Norway that he spent most of his writing years outside of Norway. In 1882, An Enemy of the People, a doctor discovers that a public bath, the mainstay of a vacation town, is contaminated by a local tannery, exposing vacationers to disease. He says so publicly. The town's folk, rich and poor, declare him an enemy of the people. He is ostracized. Stones are thrown through his windows. The lesson? "The majority never have right on its side. Never. [We] must agree that stupid people are in a terrible overwhelming majority all the wide world over." The minority is always in the right. The most dangerous foe to truth and freedom in our midst is the compact majority. Yes. The damned liberal majority."
- Hypocrisy**
- Et Dukkehjem A Doll's House** **Ibsen** also wrote about the subjugation of women: His play, *Et Dukkehjem / The Doll's House*, (1879) told the story of a seemingly happy young middle class couple, the husband a lawyer, the spoiled wife at home with three young children. After eight years of marriage she realizes that her husband believes she is not capable of serious thought, that she has been living as a doll in a doll's house. Early in their marriage, she had forged a document to save her husband's life. When this is exposed, her sanctimonious hypocritical husband denounced her. She leaves him and her children with the slamming of the door. The play was branded "immoral" and an "affront to all the "decencies." "Polite" society all across Europe and America denounced it. It was banned in England.
- Saving Lies are Self-illusions** **Ibsen** was one of the most powerful social critics of all time. He said, "The strongest person in the world is one who stands most alone" (*The Wild Duck* 1884). And, "Rob the average person of his life-illusion (saving lies) and you rob him of his happiness."
- de Balzac** **Honore de Balzac** (1799-1850), The secret of a great unexplained success is a crime not yet found out.
- Hugo** **Victor Marie Hugo** (1802-85) *Les Miserables* (1862) Jean Valjean was sentenced to five years for stealing a loaf of bread to feed his sister's starving children and 14 more years for escape attempts. **Western social critics** **Hugo** said his book was a march forward from evil to good, from the unjust to the just, from night to day, from appetite to conscience, from decay to life, from bestiality to the sense of duty, from hell to heaven, and from nothingness to God.
- Three factors deprecate people** He said that the three problems of the age were the degradation of people through poverty, the ruin of woman through hunger, and the crippling of children through ignorance. Much of the wretchedness in the book was caused by vicious laws and custom. The book became popular immediately and became a powerful factor in the 19th century movement for legal and social reform.
- Eliot** **George Eliot** (pen name of **Mary Anne Evans**) wrote *Middlemarch*. (1874) It wrote about great themes, class, political reform, education, status of women, nature of marriage, idealism, religion. The book was known as first fully adult work of fiction. **Charles Van Doren** said, "*Middlemarch* tore away the curtain of Victorian life and revealed its small-mindedness for anyone to see."
- Kipling** **Rudyard Kipling** (1865-1936) He was second only to **Mark Twain** as a popular debunker of hypocrisy. "A fool lies here, who tried to hustle the East." "You're a better man than I am, Gunga Din." "East is East and West is West, and never the twain shall meet." "Ship me somewhere east of Suez, where the best is like the worst. Where there ain't no Ten Commandments an' a man can raise a thirst." "And a woman is only a woman, but a good cigar is a

meet.” smoke.” “The sin ye do two by two ye must pay for one by one.” He declined a knightship.

France Anatole France (1844-1924), pen name of **Jacques Thibault**, “The law in its majestic equality forbids the rich and poor alike from sleeping under bridges, to beg in the streets, and to steal bread.” “Moderates are always moderately against violence.” “Religion has done love a great service by making it a sin.”

“If you tell the truth, you’ll be found out. Only the very shallow don’t judge by appearances.” **Oscar Wilde** (1854-1900) Irish wit, genius, “A cynic knows the price of everything and the value of nothing.” Only a very shallow person does not judge by appearances. Patriotism is the virtue of the vicious. Nothing succeeds like excess. Religion is the fashionable substitute for belief. If one tells the truth, one is sure, sooner or later, to be found out. There is only one class that thinks more about money than the rich, and that is the poor. The poor can think of nothing else. That is the misery of being poor. Morality is simply the attitude we adopt towards people we personally dislike. To recommend thrift to the poor is both grotesque and insulting. I may not agree with you; but I will defend to death your right to make an ass of yourself.”

Huxley Thomas H Huxley (1825-95) Brit, biologist and anthropologist, “sick of the dilettante middle class,” established *Workingmen’s Lectures* at the Royal College of Mines. **Huxley** transformed it into prominence. It taught basic science directly to the people.

Zola Emile Zola (1840-1902) In 1895, the French Army convicted **Alfred Dreyfus**, a Jew, of being a German spy and sent him to Devils Island. In 1896, the Army discovered the real traitor, not a Jew, and kept it secret without punishment and kept **Dreyfus** on Devils Island. **Zola** exposed it in 1898 with his “*J’accuse*”..

Bierce Ambrose Bierce (1842-1914), an American journalist, in the spirit of **Voltaire’s** *Philosophical Dictionary*, wrote the *Devil’s Dictionary*. Samples: “A Christian: one who believes that the New Testament is a divinely inspired book admirably suited to the spiritual needs of his neighbor. . . . Impiety is not worshiping my God. . . . To Pray: To ask that the laws of the universe be annulled on behalf of a single petitioner, confessedly unworthy. Primate: 1. The head of a church. 2. A monkey.

Cheney Edward Potts Cheney, *historian*. “The law locks up both man and woman, who steals the goose from off the common. But lets the greater felon loose, who steals the common from the goose.”

Wharton Edith Wharton, *The House of Mirth* exposed “high society,” all its shoddiness, vulgarity, and selfishness. #

Communist Manifesto: “A spectre is haunting Europe; the spectre of Communism” Political Theory, communism: **Karl Marx** (1818-83) German philosopher, economist, historian, social critic, political theorist, journalist and revolutionary, was influenced by the social ideas from the French Revolution, the economic ideas of the industrial revolution in England, and the philosophical ideas coming out of Germany.

His *Das Kommunistche Manifest*, advocated the abolition of private property, the rights of the proletariat, and the eventual establishment of a classless society. It was the most influential political pamphlet in modern history. It called for the lower classes to revolt.

“A Spectre is haunting Europe-the spectre of Communism. Let the ruling class tremble at the Communist revolution. States have two classes, the bourgeoisie, who own the wealth of the state, and the proletariat, who have nothing but their ability to work. The proletarians have nothing to lose but their chains. They have a world to win.” (**Engels** (ref. 1845), was the *nominal* co-author.)

History is class struggles **Marx** said philosophy is an interpretation of the world in order to change it; that history was not the story of rulers and battles but of economic class conflict, and that the bourgeoisie in 100 years had created more colossal productive power than all previous generations together.

The *Manifesto’s* preface said, “All history has been a history of class struggles, a struggle between dominating and dominated classes at various stages of class development.”

Also, “The ruling ideas of each age have ever been the ideas of the ruling class.” But, historians associated with and wrote about the movers and shakers of a culture, kings, clergy, scientists, who could read and write. The lower classes could not.

Marx called his Political Theory “historical materialism.” To him, history was economics in action; economics was the basic human science. He used some of **Ricardo’s** (ref.1817) ideas to support it. The key to materialism is understanding the economic forces that determine human interest.

Marx changed historians’ focus

He focused on the process the bourgeoisie had invented, i.e., the money process, new ideas supplanting older ones constantly, not the physical achievements (factories, bridges, railroads).

That is, the *bourgeoisie* had started a permanent revolution. This needed men and women who liked change. **Marx** was a new type of historian. He forced historians to consider that economic factors were basic forces in history. For **Marx**, differences among humans were due to environmental factors.

**Karl Marx
Quotes**

"The state is the ideologically legitimized power of the ruling classes over the working classes; its disappearance under genuine egalitarian and advanced productive and social conditions is thus necessary by definition." He ridiculed democracy,

"The oppressed are allowed once every few years to vote which particular representatives of the oppressing class are to represent and depress them." "Workingmen have no country."

1848
**Marx
Quotes**

Marx also denigrated religion, "My philosophy's creed is, I detest all the gods. . . Religious suffering is . . . the expression of real suffering and a protest against real suffering. It is the opium of the people." "Religion is used in a capitalist society to keep the masses in their place by offering hope in a next life." (**Napoleon**, among many others, agreed. See 1532).

"Christianity justified slavery, glorified serfdom in the Middle Ages, and equally now defends the oppression of the proletariat, thought they make a pitiful face of it." He said that religions contributed to people's misery by encouraging them to think of themselves as unworthy.

**Marx
Quotes**

"The philosophers have only *interpreted* the world, in various ways. The point, however, is to *change* society." **Marx** accepted **Hegel's** notion of great forces, but claimed to start with concrete material reality, and saw the great forces as a struggle of the working classes against the ruling classes, which would end with the triumph of the working class.

He saw how the ruling class exploited and controlled the lower classes and called on workers to throw off their chains. His *Communist Manifesto* said, Workers of the world, unite." Today, all serious history encompasses economic history.

The theory of Communism may be summed up in a sentence: "Abolish private property." #

1848
**Thomson
quantified
absolute
zero**

$$\begin{aligned}P &= VT \\ V &= P/T \\ T &= P/V\end{aligned}$$

Physics, gasses: The concept of an absolute zero as the lowest theoretical temperature where all molecular activity ceases and gasses shrink to their smallest possible size was known. But its actual *value* was not known (ref. 1802). **William Thomson** (ref. 1846) calculated it as minus 273.16 Celsius for all substances. So, a fixed volume of gas's pressure increases 1/273 each Celsius/Centigrade degree increase. Or: "At a constant *pressure*, a gas's *volume* increases 1/273 each Celsius/Centigrade degree increase." The three ways to express the formula of the pressure/ volume temperature relationship of gasses are $P=VT$, or $V=P/T$, or $T=P/V$ using the Celsius/Centigrade value for temperature / thermal energy. (more **Thomson** 1851, '53, '67, 92).

**Five
Wounds
of the
Church**

Catholic fear of criticism: **Antonio Rosmini**, priest, PM of the Papal States, wrote *The Five Wounds of the Church*, 1. remoteness of the clergy, 2. uneducated priests, 3. disunity and acrimony among bishops, 4. Church subservience to wealth, 5. dependence of lay appointments by the state. So it was put on the *Index*. Un-educated Catholics, the majority, were illiterate in any case. He was forced to retire.

1848
**Women's
rights**

Democracy, women's civil rights: Women held a convention at Seneca Falls, N Y, to discuss women's rights. Local female Quakers organized it along with **Elizabeth Cady Stanton**, not a Quaker. They planned the event during a visit to the area by **Lucretia Mott**, a Quaker, famous for her speaking ability. Women were usually not allowed to speak in public.

1848
**Speed
of light**

Physics, optics: Armand Hippolyte Fizeau (1819-96), French, to measure the speed of light, built a device with a mirror eight kilometers (five miles) from its light source. He calculated light speed just 5% high. He also confirmed Doppler's 1842 prediction that a Doppler effect would apply to electromagnetic / light waves, not just to sound waves, by seeing that light from stars and galaxies receding from Earth would appear redder than light from approaching stars.

**Fizeau found
that sunlight
was made
of colors,
(like Newton)**

How so? The electromagnetic spectrum contains electromagnetic waves of widely different frequencies/wave lengths. X-rays, Gamma rays, radio waves, sunlight's waves, etc. Electromagnetic waves have no color, including sunlight waves. Those frequencies that together we see as sunlight occupy only a small portion of the full electromagnetic spectrum. The human eye is not acute enough to distinguish the different frequencies that make up the colors that make up sunlight.

Recall, **Newton** directed sunlight through a prism which spread the frequencies apart. He could

thus see the different constituent colors of sunlight but wasn't aware of electromagnetic waves.

The human eye can see the different colors making up sunshine without a prism when they see a rainbow, where individual raindrops act like prisms do and reflect / refract the different frequencies of sunshine which appear as red, blue green etc. Some colors are not in a rainbow, such as brown and pink. Light frequencies are the only electromagnetic wave frequencies visible to humans. All other frequencies are only detected by electronic receiving devices such as radios, TV sets. (*Frequency* is how many waves pass a point in a second.)

The lowest visible light wave frequency is red, the highest is blue

Newton had discovered that sunlight was made of a spectrum of colors. Some appear distinct and recognizable to us, orange, yellow, green, or blue, when separated by a prism or by raindrops making a rainbow, but the distinct colors we see merge seamlessly into a very slightly different color with a very slightly different frequency. So there are as many colors as there are frequencies. In other words, innumerable. Our eyes can distinguish the distinct ones when a prism separates them. The highest frequency color waves visible to us is blue/violet. To our naked eyes they appear together as sunlight

Red and blue-shifts explained

All electromagnetic waves (including sunlight waves) from a receding source, a star or galaxy going away from Earth, would be stretched out like **Doppler's** receding sound waves (a train going away) and thus reach Earth at a slightly lower *frequency*, that is, more to the red end of sunlight's component colors' frequencies. So from a receding source, Sunlight / starlight appears redder (like the longest wave length/ lower *frequency* red waves. This is called *the redshift*.) (Violet is the shortest.) The faster a star or galaxy is receding from Earth, the redder its light appears. (See **Hubble's Law**, 1929)

Conversely, light waves from a source, a star or galaxy, approaching Earth are bunched up, compressed into the higher frequency blue-violet end of the visible light spectrum and so appear bluer, the *blueshift*. Some animals can hear sound frequencies higher than the human ear can hear, some animals can see some light frequencies higher than the human eye can see.

1848 Flaubert Quotes

Philosophy, science: **Gustave Flaubert**: *The Temptation of St. Antony*, "My kingdom is as wide as the universe and my wants have no limit. I go forward always, freeing spirits, and weighing worlds without fear, without compassion, without love, without God. I am called science."

Fanaticism is religion

"Nothing great is ever done without fanaticism. Fanaticism is religion, and the 18th century *philosophes* who decried the former actually overthrew the latter." "I have a religion, my own religion, and I even have more religion than all of them, with their mummary and hocus-pocus."

Clergy are humbugs

"I believe in the Supreme Being, in a Creator, whatever He is, who has placed us here to fulfill our duties as citizens and as fathers; but I don't need to go to church to kiss silver plates and empty my pocket to fatten a lot of humbugs who are better fed than we are. For one can honor Him just as well in the woods, in a field . . . My personal God is the God of **Socrates, Franklin, Voltaire, and Béranger**."

Brigham Young: Mormon beliefs:

Mormonism: Mormons had now settled in Utah. In 1848, Utah became a US territory that Mexico ceded to the US as we won the Mexican-American war. In 1851, **Brigham Young** became governor of the territory. His *Book of Mormon Sermons*, said, "I tell you the law of God in regard to the African race. If the white man who belongs to the chosen seed (Mormon) mixes his blood with the seed of Cain (Negroes), the penalty, under the law of God, is death on the spot."

Slavery is divine. Marry a Black. Die

Blacks could not become priests. He said slavery was a divine institution, and not to be abolished until the curse of Ham (definitions vary, possibly being Black) is removed.

Adam was Jesus' dad

Slaves were not to be preached to, or to be interfered with in their servitude. Young wanted Utah to become a slave state. Also, "Any young man who isn't married by 21 is a menace to the community." Mormons believe Adam was **Jesus's** biological father.

All men will eventually be restored to a state of happiness. There will be an imminent *Second Coming*. **Young** had 55 wives and 56 children. Mormons reject *Original Sin*.

1849 Thoreau: Resistance to Civil Government

Political Theory, civil disobedience: **Henry David Thoreau** (1817-'62) questioned why he should be forced to pay taxes to a government's stupidity and injustice, such as the 1846-47 war with Mexico or the Fugitive Slave Act. He was of course prosecuted but his book, *Resistance to Civil Government* urged people to resist evil, even at the cost of their freedom. He paid his highway and school taxes. His book had little immediate effect, but had lasting influence. (See 1907-**Gandhi**)

1849-52 a treasure of historical records	King Ashurbanipal's library:, Archeologists Austin Henry Layard, Brit, and Hormuzd Rassam, discovered 30,000 tablets from Sumerian and other Mid-East kingdoms in the libraries in Nineveh of King Sennacherib (reigned 705-681 BC) and King Ashurbanipal (reigned 669-632 BC), last king of the Neo-Assyrian Empire. The tablets, included the Sumerian epic, <i>Gilgamesh</i>. Ashurbanipal and his ancestor kings had all important tablets copied and preserved in their libraries. The tablets were shipped to the British Museum. (See 1872). Almost all the tablets were legal or commercial. Ten were literary works including <i>Gilgamesh</i>. A flood story similar to one in <i>Genesis</i> was published in 1875 (see 1875). It was later determined to be part of the <i>Epic of Gilgamesh</i>.
The afterlife	1850 <u>Philosophy</u>: Heinrich Heine (1797-1856), German, poet, "Every religion, after its own fashion, guarantees consolation in suffering. <u>With Jews, hope</u>: We are in captivity, Jehovah is angry at us, but he will send a savior. <u>With Muslims, fatalism</u>: No man escapes his destiny . . . <u>With the Christian, spiritual contempt of pleasure and joy</u>, morose craving for heaven: on earth temptation for the wicked, above salvation." "God has given us no manifesto indicating life after death; nor did Moses speak of it. The pious are perhaps unfair to God, in taking immortality so seriously. . . No Jew can ever believe in the divinity of any other Jew."
1850 On the Moving Force of Heat	<u>Thermodynamics</u>: the branch of science dealing with how heat and other forms of energy move within a system, whether in an atom, a hurricane, or a black hole (ref. 1783, '96, 1915-6, '73-4, 1982, 2015, p. 423). Rudolf Clausius (1822-88) German physicist and mathematician restated Sadi Carnot's principle known as the Carnot cycle and gave the theory of heat a truer and sounder basis. He published his most important paper <i>On the Moving Force of Heat</i>. He said, "The energy of the world is a constant. The entropy of the world always increases." Clausius coined the word <i>entropy</i>. His paper stated the basic ideas of the <i>2nd law of thermodynamics</i>.
First Law of Thermo- dynamics. Energy is indestruc- tible and constant.	Clausius and James Joule (ref. 1843) articulated Helmholtz's 1847 principle of <i>conservation of energy</i>, a/k/a the <u>First Law of Thermodynamics</u> for thermodynamic systems. Namely, "<u>In a closed system, or the universe, energy is indestructible and constant</u>; it cannot be created or destroyed. It may, however, change its form, i.e., electricity to heat to light, etc." <u>Work and heat are both ways to transform energy from one form to another.</u> The <i>First Law of Thermodynamics</i> concerns the <i>quantity</i> of energy in a thermodynamic process This first law is subject to the <i>Second Law of Thermodynamics</i>, which concerns the <i>quality</i> of energy, what kinds of energy are there and how they relate just below.)
Second Law: Entropy is, energy lost into the sink of space. It has been stated several ways.	<u>Second Law of Thermodynamics</u>: important law, has been expressed at least 5 ways: 1. Sadi Carnot, had shown that there is an upper limit to the efficiency of conversion of heat to work in a heat engine. This aspect of the second law is also known as Carnot's rule or limit. It states that <u>when energy is transferred or transformed, some of it is wasted (entropy)</u>. Also that there is a natural tendency of any isolated system to degenerate into a more disordered state. Also that the total wasted energy, entropy, in an isolated system can never decrease, and is constant if and only if all processes are reversible. Isolated systems naturally evolve towards having the same temperature, the state with maximum entropy. 2. Rudolf Clausius: No engine can convert energy into mechanical work 100% efficiently. Any transformation of energy from one form to another loses some energy, dissipated in heat, light, friction, etc., and it can't be recovered." namely "entropy." "<u>The energy of the universe is a constant: the the entropy of the universe always increases.</u>" 3. All viable engines have a cold sink where unusable thermal energy goes." Thermal energy / heat flows only from a hotter body to a cooler one. Some energy transfers, some does not, but it is still somewhere (in the great heat sink, space).
Thermal energy dissipates into space	4. Max Planck in 1900 said: "Every process occurring in nature proceeds in the sense in which the sum of the entropies of all bodies taking part in the process is increased." In the stars of the hydrogen atoms are fusing, releasing light. Entropy, i.e, unusable energy, always increases. 5. Thermal energy drains into a lake of equality, space, a cold sink, where it's no longer usable. <u>The Third Law of Thermodynamics</u> was discovered in 1906 (See 1906) <u>The Fourth Law of Thermodynamics, Zeroth law</u>, was discovered in 1935. (See 1935)

- Before 1850.** **Time, energy & mass were 3 separate concepts** Before 1850, time, energy, and mass were three separate concepts, each a balanced world in itself. No one knew exactly what thermal energy was. (See 1798-**Rumford**. It is atoms or molecules anywhere vibrating, the higher the temperature, the faster they vibrate. (See 1859-Kinetic theory and 1823-thermodynamics-**Benjamin Thompson**). The laws of thermodynamics are valid as they are based on verified measurements. (**Einstein** in 1905 showed matter and energy were equivalent.)
- 1850 The Wabash and Erie canal linked the Great Lakes to Ohio.
- Remains of the Olmec civilization (active c.1500 BC-c.400 BC) were discovered in South Central Mexico on the Gulf of Mexico. They were thought to be part of the Aztec civilization.
- 1850 **Pendulums swing in one plane** **Physics, light: Jean-Bernard-Leon-Foucault** (1818-68), French, physicist, showed that light goes through water slower than through air. In 1862, he had calculated light goes 298,000 Kps thru air, just .6% low. (Light slows to c.225,000 Kps thru water, c.200,000 Kps thru glass.)
More importantly, He and **Fizeau** (ref. 1848) in 1851 built a 200 foot pendulum. Pendulums swing in one plane, and knowing Earth revolves, it appears that the pendulum changes planes. A pendulum swinging in one plane showed that it is the Earth that is rotating, not the pendulum.
- 1850 **Macaulay, How truth triumphs** **Knowledge, How truth triumphs: Lord Macaulay** (ref.1778, 1833): "Time advances; facts accumulate; doubts arise. Faint glimpses of truth begin to appear and shine more and more unto the perfect day. The highest intellects, like the tallest mountains are the first to catch and reflect the dawn. They are bright while the level below is still in darkness.
But soon the light. . .descends on the plain and penetrates to the deepest valley. First come hints, then fragments of systems, then complete and harmonious systems. The sound opinion, held at first by one bold speculator, becomes the opinion of a small minority, of a strong minority, of a majority— of mankind." **Macaulay** also said "Laws are the expressions of the power of that class that has power over the rest of the community"
- c.1850-76 **Bakunin, noble, anarchist** **Political Theory, Anarchism: Mikhail Bakunin** (1814-76), Russian revolutionary and theorist, born a noble, influenced by **Marx** and **Hegel**, had a long career as a European revolutionary. He was imprisoned for 12 years, influential with all European and Russian revolutionaries. His beliefs were based on five concepts, 1. Liberty, 2. Socialism, 3. Federalism, 4. Anti-theism, and 5. Materialism.
He founded "*collective anarchism*," where labor unions would take over the means of production and the buildings and capital. He correctly predicted that if **Marx's** followers took over, they would be a dictatorship over the proletariat, not of the proletariat.
- 1851 **Bakunin Quotes** In *God and the State*, **Bakunin** said, "Revolution need not be violent. "The object of all law is to exalt into a system the exploitation of the workers by a ruling class. The liberty of man consists solely in this, that he obeys the laws of nature because he has himself recognized themselves as such and not because they have been imposed upon him. . . by any foreign will. . .human or divine.
- History has been the poor getting killed for someone's ego** "The idea of God implies the abdication of human reason and justice; it is the most decisive negation of human liberty. It necessarily ends in the enslavement of all people.
- Until now, all human history has been only a perpetual bloody immolation of millions of poor human beings in honor of some pitiless abstraction, God, country, power of state, national honor, historical, judicial rights, political liberty, or public welfare."
- Religion sanctifies violence** "Theology is the science of the divine lie, jurisprudence . . . of the human lie, and metaphysics and idealistic philosophy the science of any half-lie." "If there is a state, then there is domination, and in turn, there is slavery." "Religion has always sanctified violence and transformed it into right.."
- Religion is collective insanity** "Religion is collective insanity." "It was very fortunate for Christianity that it met a world of slaves."
"If God existed, it would be necessary to reject him, as the idea of God negates our freedom. Traditional religion tells us we must conform to God's idea of humanity to become fully human."
- 1851 **Psychology, Adventure: Herman Melville**, published *Moby Dick, or The Whale*, a sea adventure. A mad ship captain, Ahab, is obsessed to kill a great white whale known to be a killer. **Melville** had served on a whaling ship and explained it well. Told by a common seaman, the protagonist witnesses the quarry being hunted down and with three harpoons in it, turns and destroys the whaling ship and mad captain. The seaman is the sole survivor. A major theme of the book

is the powerlessness in the face of the “power of darkness” and the confrontation of good and evil.

- 1852**
Uncle Tom's Cabin
Slavery: **Harriet Beecher Stowe** (1817-96) religious, wrote *Uncle Tom's Cabin*, on the injustice of slavery. It was widely read, became a popular stage play. It powerfully explored themes of faith, the immorality of slavery, and the concept of humanity, ultimately contributing to the abolitionist cause and significantly influenced how Americans perceived slavery. It was the most powerful writing in mobilizing American opinion against slavery. The anti-slavery movement grew in the Northern states.
- An evolutionist**
Imperialism cleared inferior races from the Earth
Biology, evolution: **Herbert Spencer** (1820-1903), Brit, biologist, philosopher, libertarian, was an evolutionist before Darwin. He published *The Development Hypothesis* which strongly supported the concept of evolution as against the Biblical account of special creation.
He argued that imperialism had served civilization by clearing the inferior races off the earth. He said, "The forces which are the great scheme of perfect happiness, taking no account of incidental suffering, exterminate such sections of mankind as stand in their way." "Most people mistake law for justice and authority for liberty. You will hear them talk of "liberty under law," and are content to see it so deep under the law that it is completely obliterated." (more 1857, '59, '62, 70s).
- 1852**
hydrogen balloon
Physics: **Henri Giffard** flew a hydrogen balloon with a 3 Horsepower steam engine for 20 miles over Paris. **George Cayley**, Brit, built a glider with lift and stabilizer controls, first manned glider flight.. **Henri-Victor Regnault** (1810-78) French physicist, said that absolute zero was minus 273 Celsius (-460 F)
- 1853**
refrigeration
Physics: **James Joule** (ref. 1843, '50, 1906, p. 426) and **William Thomson** (ref. 1846, '48): Expanding gas consumes energy and so its temperature drops, the basic principle of refrigeration and the heat pump.
Oxford admitted non-Anglicans. Cambridge did in 1856. In 1871, non-Anglicans could teach at Oxford.
- 1853-55**
Racism: Compté **Joseph de Gobineau** (1816-82) French, educated in Germany, was the most important academic racist of the 19th Century. He published *Essai sur l'inegalite des races humaines*. It said racial difference was key to understanding the problems of history. "The fate of civilizations is largely determined by racial composition." "Aryans" were inherently superior in brains and character to all other races.
- 1854**
Henry David Thoreau
Philosophy: **Henry David Thoreau** (ref. 1849), *Walden*. He lived two years in a cabin near a woodland pond. He wrote voluminously, much about the glory of the natural world, supported civil disobedience. He said, "The mass of men live lives of quiet desperation." And, "I do not see why the teacher should be taxed to support the priest, and not the priest to support the teacher."
- 1854**
Dickens
English society: **Charles Dickens** (ref. 1848-Social Critics) wrote about the pervasive inhumanity and dehumanizing effect of the industrial age in *Hard Times*.
He created some of the world's best-known fictional characters and is seen by many as the greatest novelist of the Victorian era. His works were extremely popular.
In the 20th century, his fame increased. His novels and short stories are still widely read. **George Bernard Shaw** (1916) said *Hard Times* "is **Karl Marx, Carlyle, Ruskin, Carpenter, Morris**, rising up against civilization itself as a disease, and declaring that that it is not our disorder but our order that is horrible; that is not our criminals but our magnates that are robbing and murdering us."
- 1854**
Cholera
Medicine: **John Snow** (1813-58), Brit, physician, saw that most of the cholera in London was near a well near a sewer pipe. He thus deduced cholera was caused by contaminated water. He had the handle taken off the well's pump. Cholera declined at once. He died of a stroke at 45.
Slavery: **Theodore Parker**, Boston, Unitarian minister, Anti-Slavery Society: "Government over all, by all, and for the sake of all. The *Bible* sanctions slavery; so much the worse for the Bible."
- 1854**
Political Theory, democracy: **Abraham Lincoln**, (1809-65), lawyer, US president 1861-65, "The legitimate object of government, is to do for a community of people whatever they need to have done, but can not do at all, or can not do so well for themselves separately. That which people can do as well for themselves, government ought not to interfere." (More **Lincoln** 1857-58, '63)
- 1855**
Electric Timeline on pp. 422-431
Electromagnetism: **James Clerk-Maxwell** (1831-79) Scot, possibly third greatest scientist, published *On Faraday's Lines of Force* (ref. 1831). He deduced the lines could be put into mathematical equations. He did so. **Faraday** thanked him. His paper showed how electricity and magnetism were related. He also showed that white light would result from red, green, & blue lights.)

Wallace: Species evolved from other species. Biology, evolution: Alfred Russel Wallace (1823-1913), an accomplished self-educated naturalist, with whom **Darwin** had corresponded regarding evolution, published an article in the *Annals and Magazine of Natural History* that posited that new species evolved from pre-existing ones. It was very similar to **Darwin's** then unpublished theory which **Darwin** called *Natural Selection*. **Wallace** was also influenced by **Malthus** and **Chambers's** *Vestiges of the Natural History of Creation*. **Darwin** continued to organize evidence for evolution as he saw it for his book.

1856 **Problem of Suffering** **Darwin** on the *Problem of Suffering*: **Darwin** said, "The sufferings of millions of the lower animals throughout almost endless time are apparently irreconcilable with the existence of a creator of unbounded goodness." (Current scholar **Michael Almeida** says the suffering of animals is "perhaps the most serious and difficult" version of *The Problem of Suffering*.)

1856 **Biology: Neanderthal bones,** (ref. 370K BC) were first found near Dusseldorf in the Neander Valley (*tal*) in Germany. Its brain was equal to or larger than Modern man. They interbred with *Homo sapiens* to a minor degree. *Neanderthals* were stockier than *Homo sapiens*. *Homo sapiens* today are virtually same physically as they were c50,000 years ago, but taller. No biologist at the time considered *Neanderthals* to be an ancestor of *Homo sapiens*.

1857 **Chemistry, biology: Louis Pasteur** (1822-95), French, Dean of the Science Faculty at Lille, wrote *Memoire sur la Fermentation Appellee Lactique / Treatise on the Fermentation Known as Lactic*. He heated wine, but not to boiling, to kill bacteria. It kept the wine from souring. Later he did the same for milk. He found organisms that live without oxygen. He saved the silk industry in the South of France. Also he developed a vaccine that saved the wool industry. (more 1860, '62)

Kinetic Theory of gasses/ Gas is particles in constant agitation. Thermodynamics: Clausius (ref. 1850) published *On the Nature of Motion Called Heat*, describing the kinetic theory of gases: "Gas is an immense number of submicroscopic particles, all of which are in constant, rapid, random agitation. The randomness arises from the particles' collisions with each other and with the walls of the container." Gas pressure results from such submicroscopic particles of gasses' collisions with the walls of a container at different velocities. This explains the macroscopic properties of gases, such as pressure, temperature, viscosity, thermal conductivity, and volume, by considering their molecular composition and motion.

Framers of Constitution didn't intend to protect Negroes Law, **Dred Scott** decision: Chief Justice **Roger B. Taney** of the US Supreme Court wrote the 7-2 decision, that descendants of slaves were not citizens; they were property. "The right of property in a slave is distinctly and expressly confirmed in the *Constitution*." **Taney** said that the framers of the *Constitution* did not regard Negroes as being among the "people" for whose benefit and protection the US government was founded." (This treats all the "framers" as a uniform group, which they surely weren't.) The **Dred Scott** decision was not an aberration. The Court ruled against Blacks, Native Americans, and Asians consistently into the 20th century.

1857 **Slaves are property.** To get Southern votes, the *US Constitution* was silent on slavery. The District Court said, "[W]e are almost convinced that slavery was in the province of God." **Taney's** Court upheld it. The 1850 *Fugitive Slave Act* let slave owners to go into "free" states to capture escaped slaves. Most of the signers of the *Constitution* were from the South. Slavery was legal in every Southern state and most Northern states. In New York, Blacks could vote only if they owned \$250 in property, a fortune then.

A deceptive legal theory Law, **Originalism**: **Taney's** theory of interpreting legislation, including the provisions of the *Constitution*, was to deduce the *intent* of the writers of the *Constitution*. This is one of three or more theories of statutory interpretation that racists not until 1980 called *Originalism*. (See 1980s)

Taney went further and struck down the entire *Missouri Compromise* as a limitation on slavery that exceeded Congress's Constitutional powers. Justices **John McLean** and **Ben Robbins Curtis** dissented.

Recall that the *Constitutional Convention* rejected **George Mason's Bill of Rights**, and added a substantially identical *Bill of Rights* only after some states had ratified the original *Constitution* on condition that a *Bill of Rights* be adopted. The *Bill of Rights* adopted said nothing about slavery.

Scottish judge: We sit to enforce right, not **Taney's** decision was criticized widely in the North but praised by slave owners. It, *Uncle Tom's Cabin* (1852), and **John Brown's** (The Man who ended slavery **Hitchens**) 1859 raid at Harpers Ferry galvanized abolitionists. Scottish Law Lord Kames, 80 years prior, in Scotland's highest court, had freed a slave brought to Scotland saying, "We sit to enforce right, not to enforce wrong." Jamaican

- to enforce wrong" law [written of course by British slave owners], being here unjust, could not be supported in Scotland." US Supreme Court Justice **William O Douglas** a century later said, "**Dred Scott** was the most unworthy, ill-advised opinion in the court's long history."
- 1857 **Racial Discrimination** Political Theory, slavery: **Abraham Lincoln**, "When the white man governs himself, that is self-government; but when he. . .also governs another man, that is. . .despotism."
"If the Negro is a man, my ancient faith teaches me that "all men are created equal," and that there can be no moral right in connection with one man's making a slave of another. I protest against that counterfeit logic which concludes that, because I do not want a black woman for a slave, I must necessarily want her for a wife. I need not want her for either. [H]er natural right to eat the bread she earns with her own hands without asking leave of any one else, she is my equal, and the equal of all others." American women, like women worldwide, could not vote.
- 1857 **Mormonism:** At Mountain Meadow, Utah, a Mormon mob killed 120 settlers promised safe passage in a wagon train bound for California. Utah Governor **Brigham Young** stated in public forums that "God [presumably disguised as Mormon thugs] had taken vengeance on the settlers."
- 1857 **Progress, its Law and Cause** Biology, sociology: **Herbert Spencer**, (ref. 1850) applied biological principles to politics. His *Progress, its Law and Cause* posited an all-embracing concept of evolution as the progressive development of the physical world, biological organisms, the human mind, and human cultures.
He contrasted creationism and evolution, argued strongly for evolution, saying species had been modified by circumstances. He preached a businessman's individualism, a return to *laissez faire*.
- Men are not rational** Said, "Men are not rational beings as commonly supposed. A man is a bundle of instincts, feelings, and sentiments which severally seek their gratification, and those which are in power get hold of the reason and use it to their own ends, and exclude all other sentiments and feelings from power."
"We constantly observe that those who fawn upon the great are overbearing to their inferiors."
"Our lives are universally shortened by our ignorance." (more **Spencer** 1859, '62, '70s, '71, '79)
- 1858 **The Great Eastern** Physics, Steam ships: The *Great Eastern*, a British iron paddle-wheel steamship was launched in London. It was by far the largest ship ever built (until 1899). It was 692 ft long. It could carry 4,000 passengers (crowded). It made a few trips to New York City. It was not profitable. It couldn't compete with Cunard ships. In 1866 it laid an Atlantic cable. It sold for scrap in 1888.
- 1858 **Cellular pathology. "Every cell from a cell"** Biology, Cells: **Rudolf Virchow** (1821-1902), Prussian reformer, published *Cellular Pathology*. Said "Every cell from a cell." "Life is not the result of supernatural phenomena and "cells are the link in the great chain of . . . formations that form tissues, organs, systems, and the individual." Cells are the fundamental unit in health and in sickness. Diseases are disturbances of living cells. He was thus a founder of the new science of pathology. He credited **Remak's** 1845 discovery of *mitosis*.
- Alfred Russel Wallace, "the best fittest survive."** Biology, Evolution: **Alfred Russel Wallace** (ref. 1855) sent **Darwin** from the Malay Archipelago a more complete paper on his evolution theory. **Wallace** saw patterns among creatures. He even used the phrase, "on the whole, the fittest will survive," asking that it be given to **Lyell** for the *Linnean Society*. So **Darwin** and **Lyell** had **Wallace's** paper and a portion of **Darwin's** 1844 unpublished essay on *Natural Selection* read to the *Linnean Society* and published in its journal.
There was no reaction. **Darwin** continued work on his book on natural selection.
- 1858 **Abraham Lincoln** Political Theory, slavery: In America, The tension between Southern slave-holding states and the abolitionist movement in the Northern free states was increasing. **Lincoln**, not yet the president, said, "A house divided against itself cannot stand." I believe this government cannot endure permanently half slave and half free. I do not expect the Union to be dissolved - I do not expect the house to fall - but I do expect it will cease to be divided. It will become all one thing or all the other."
"As I would not be a slave, so I would not be a master. This expresses my idea of democracy."
- China stagnated** China stagnated culturally and scientifically. Why? After the Mongol conquest in the 12th century, it remained a unified empire run by single Mandarin bureaucracy. Nothing competed with or threatened the structure of the state, not even the Manchu takeover in 1644. It had no pioneering scientists who challenged the status quo. In Europe the states competed with each other. Progress needs competition.

1859-99 *Darwin-Origin of Species Huxley Mill Acton Ingersoll White*

- Kinetic theory of Gasses** 1859 Physics, Gas theory: James Clerk Maxwell improved the kinetic theory of gas. Said innumerable gas molecules bounce off each other exerting pressure on their container. So heating a gas makes the molecules bounce faster. Temperature is a measure of the mean squared velocity of the molecules. (More **Maxwell** 1861-2, '67, 77, pp.426-30)
- Elements emit waves** 1859 Physics, Optics: Gustav Kirchhoff (ref. 1858) and **Robert Bunsen**, Germans, built a spectroscope. It showed that every element emits a distinct set of wavelengths. The Sun's spectrum had dark lines. They deduced the dark lines indicated sodium and other elements. So they thought such elements existed all over the universe. They saw an unexplained dark line, posited that it was a new element. It was later found and named helium. Spectroscopes can also determine a star's temperature. (More 1914)
- John Stuart Mill & Harriet Taylor. Man must be free except to harm others** Political Theory, civil rights: On Liberty John Stuart Mill's (ref.1835, '51) most important and influential book. The book details the nature and limits of the power that can be legitimately exercised by society over the individual and champions individuality and nonconformity. It disputed Hobbes. **Mill** said, "The sole end for which mankind are warranted, individually or collectively, to interfere with the liberty of action of anyone is to prevent harm to others." "Whatever crushes individuality is despotism, by whatever name . . . Prohibit nothing on the grounds that it harms a voluntary participant. Liberty consists of doing what one desires. Speech should not be censored as it may contain some truth. Erroneous ideas may be exposed and abandoned"
- True freedom is pursuing our own good in our own way.** The only freedom which deserves the name is that of pursuing our own good in our own way, so long as we don't attempt to deprive others of theirs, or impede their efforts to obtain it." These ideas are based on utility, not on natural rights. The only exceptions: Men can't sell themselves into slavery. Man can be compelled to pay taxes and show up in court.
- Social conformism** Most of *On Liberty* discusses not governmental restraints on human liberty but on the threat posed by social conformism, "the demand that all other people resemble ourselves." **De Toqueville** had also written on this problem. "Self censorship is a potent force. We can all name words we do not utter."
- 1859** *On Liberty* applied **Mill's** ethical system of utilitarianism to society and the state. He tried to establish standards for the relationship between authority and liberty. He emphasized the importance of individuality, which he conceived as a prerequisite to the higher pleasures—the *summum bonum* of utilitarianism.
- One of the very most important books of political theory** Further, society can and does execute its own mandates: and if it issues wrong mandates instead of right, or any mandates at all in things with which it ought not to meddle, Society practices a social tyranny more formidable than many kinds of political oppression, since, though not usually upheld by such extreme penalties, it leaves fewer means of escape, penetrating much more deeply into the details of life, and enslaving the soul itself." **Mill** also criticized the errors of past attempts to defend individuality where, for example, democratic ideals resulted in the "tyranny of the majority." Among the standards established in *On Liberty* were his three basic liberties of individuals, his three legitimate objections to government intervention and his two maxims regarding the relationship of the individual to society.
- On Liberty** *On Liberty* explained what aspects of life should be governed by the individual and which by society. He held that a person should be left as free to pursue his own interests as long as this does not harm others. In such a situation, "society has jurisdiction over [the person's conduct]."
- 1859** He rejected the idea that his liberty is simply for the purpose of allowing selfish indifference. He argued that this system will bring people to the good more effectively than physical or emotional coercion.
- On Liberty has stayed most influential.** *On Liberty*: "If all mankind minus one, were of one opinion, and only one person were of the contrary opinion, mankind would be no more justified in silencing that one person, than he, if he had the power, would be justified in silencing mankind."
- He who knows only his own side of the case, knows little of that. No one may have been able to refute his reasons. But if he is equally unable to refute the reasons on the

opposite side; if he does not so much as know what they are, he has no ground for preferring either opinion. Speech designed to incite violence can reasonably be stopped by the state.

Punish only those who don't do their duty.
Foundational text for liberal thought

This led **Mill** to conclude that a person may, without fear of just punishment, do harm to himself through vice. He said, governments should only punish a person for neglecting to fulfill a duty to others or harming others, not the vice that brought about neglect. On Liberty was a foundational text for modern liberal political thought. **Mill** said his wife, **Harriet Taylor** (1807-58) was its co-author. She thus was one of the most influential political philosophers in history, albeit without being so credited. **Mill's** other influential book was *Utilitarianism*. (See 1863, '74)

1859
Origin of Species

Biology, evolution: In November, **Darwin** completed and published his detailed 400 page *The Origin of Species by Means of Natural Selection, or The Preservation of Favoured Races in the Struggle for Life*. Its main idea, "All species of plants and animals evolved from earlier species by means of *natural selection*."

Darwin He wrote, "One general law, leading to the advancement of all organic beings, is that they multiply, vary, and the strongest live and the weakest die." "Thus, from the war of nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows." **Darwin** credited **Lyell's** geology for helping develop his theory.

"There is grandeur in this view of life, with its several powers, having been originally breathed into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved." **Darwin** was most interested in the *processes* by which one species transforms into another.

1859
Method of Natural Selection explained

Evolution by Natural Selection: **Julian Huxley**, grandson of **Thomas Huxley**, later described **Darwin's** methodology. "Darwin amassed huge amounts of data to support *inductive* premises and using a few general principles, *deduced* natural selection. He used three *observable facts* and two *deductions*. *Observable Fact One*. All organisms tend to increase geometrically (more offspring than parents, **Malthus**). Then, *Observable Fact Two*. A species's overall population tends to stay stable. Therefore,

Deduction One, There's a struggle for existence within that species where all don't survive. Then, *Observable Fact Three*, Offspring vary in fitness to survive. Therefore:

That is
Natural Selection

Deduction Two the fittest offspring, either a modified version of that species (stronger, faster, better hearing or vision, bigger wings) or a new species, survives better than his siblings and others of his species. So he or she reproduces better fit babies. That is *natural selection*.

Two
unanswered
questions

Natural Selection did not answer two basic questions; What is the precise mechanism whereby features pass from parent to child?. And how do novel features happen in the first place? This second question was only answered in 1953 with the discovery and operation of DNA.

Many earlier
theories
about
species
change

The concept of evolution was not new. It had been noted in varying degrees by **Anaximander** (504 BC), **Anaxagoras**, **Lucretius** (58 BC), **al-Jahiz** (820), **Francis Bacon** (1620), **Edward Tyson** (1699), **Linnaeus** (1735), **de la Mettrie** (1747), **Montesquieu** (hinted at species multiplying(1748, '51), **de Buffon** (1749), **Hume** (1779), **Maupertius** (1751), **Benoit de Maillet** (1755), **Erasmus Darwin** (1794), **Cuvier** (1796), **Laplace** (1796), **Geoffroy St. Hilaire** (1794), **Malthus** (1798, **Treviranus** (1802), **Goethe** (1808), **Lamarck** (1809,'15- Simple forms evolve into more complex forms), **Wells** (1818), **Diderot** (1830), **Chambers** (1844-God controls species changes), **Spencer** (1852), and **Wallace** (1855), all had varying notions of species change, but **Darwin** amassed a huge amount of evidence for species evolving by *Natural Selection*. (He did not like the word *evolution*.)

Biggest
scientific
event of the
19th century

Darwin's and Wallace's theory of *natural selection* based on the struggle for food was the single most important scientific event of the 19th century. It showed that natural causes and not a supernatural entity who created complex organisms and new species. Psychologically, *Origin of Species* dethroned humans from the idea that they were at the center of the universe.

Science
dethrones
human
arrogance

Stephen Jay Gould: (1941-2002) said, "The most important scientific revolutions all include as their only common feature that they dethrone some human arrogance from one pedestal, another of previous convictions about our centrality in the cosmos." **Darwin**, like **Hume** and most "Enlightenment" men, believed the white race was more civilized than darker ones.

1859 Significance of natural selection? The discovery of the concept of evolution by natural selection had far greater religious, social and psychological consequences even than heliocentrism, and gave rise to debate around the world. **Hegel** had put evolution into philosophy. **Marx** had put it into politics. **Darwin** put it into biology. **Darwin** questioned the uniqueness of man.

Natural Selection explained evolution of plants and animals

Origin of Species explained how natural selection evolved plants and animals in the context of Malthus's world of a struggle for food. It sold 25,000 copies in two years and was translated into most European (not Muslim) languages. Different species and sub-species had evolved in different parts of the world isolated from other parts of the world separated by water or distance.

Darwin erred when he first accepted blended inheritance and *Lamarckism*. (**Mendel** refuted this, see 1865 and 1900). **Darwin** said that **Buffon** (ref. 1749) was the first author in modern times to treat species change scientifically. *Origin* was a major win for scientific epistemology over religious thinking.

Origin of Species

Origin of Species did not mention humans. The common Western belief at the time was that all races of humans were separate species, the result of different acts of divine creation, and of course, that the white race was superior to all others. Polygenists incorrectly said that mixed race offspring would be sterile. Evolution by Natural Selection destroyed polygenism as well as one of Christianity's best arguments, the *Design Argument* by showing that complex organs could naturally evolve from simpler ones.

Darwin called it *natural* selection to distinguish it from *artificial* selection, selective breeding, eugenics, used by farmers to improve their animals' *value*. *Natural selection*, with no human direction, randomly over a long period of time improves a species (human or animal) *survivability*.

1860 Anglican

Liberal Anglicans: In March, seven prominent Anglican clerics published *Essays and Reviews*, which was friendly to **Darwin**. It described statements in the *Bible* that science had shown false. Lord Bishop **Samuel** ("Soapy Sam") **Wilberforce** of Oxford said their book "tended toward infidelity, if not to atheism," the writers were "guilty of criminal levity, wanton . . . false. . . .atheistic."

More Bible contradictions: American journalist and amateur biblical scholar **William H Burr** published, anonymously, *Self-Contradictions in the Bible*, describing 143 instances where one or more *Bible* verses contradicted some other verse.

Overall, Christian reaction to Darwin was fierce

Major Christian reaction: **Andrew Dickson White** in 1896 wrote, "*Origin of Species* came into the theological world like a plough into an ant-hill. Everywhere those thus rudely awakened from their old comfort and repose swarmed forth angry and confused."

French Abbe **Fabre d'Envieu** said that any doctrine other than that of the fixity and persistence of species was "absolutely contrary to *Scripture*." He was right.

More Christian reaction

British Catholic **Nicolas Cardinal Wiseman** said *Darwinism* "threatens even the fragmentary remains of Christian belief in England." Another theologian, "If the **Darwinian** theory is true, *Genesis* is a lie, the whole framework of the book of life falls to pieces, and the revelation of God to Man, as we Christians know it, is a delusion and a snare." He was right. Swiss theologian **Rougemont** called for a "crusade against the obnoxious doctrine," *Darwinism*.

Catholic World magazine said **Darwin** is the "chief mouthpiece of that infidel clique whose well-known object is to do away with all idea of a God." A geology professor at the Syrian Protestant College praised *Darwinism*. He was fired. **Wallace** said *Darwinism* affirmed God.

Attacks on Darwinism "Life force"

Most of the attacks on *Darwinism* were clergy saying that it contradicted *Scripture*, not scientists saying that it was inaccurate. In England, **Darwin's** most well known *scientific* critic was **Richard Owen**, a distinguished Anglican biologist who said that each species had its own *life force*, an *organizing energy*, that couldn't transmute into a different species.

Darwin's former geology professor at Cambridge said **Darwin** was "plunging humanity into a lower grade of degradation than any known."

Another eminent scientific critic was biologist **Louis Agassiz** of Harvard (ref 1840), who had built his career and a coherent philosophy on the creationist premise that species are ideas in God's mind. **Agassiz** strongly opposed immigration of Catholics and Jews into the US who would dilute white Anglo-Saxon Protestant America. Needless to say, he said Blacks were the lowest race.

The story is told that the bishop of Worcester told his wife that **Darwin** said that we humans descended from lower primates. The bishop's wife said, "My dear, descended from the apes. Let us hope it is not true, but if it is, let us pray that it will not become generally known."

- 1860 Skeptic** Biology: Thomas Huxley (1825-95), Brit, biologist, who had little formal schooling, but due to his brilliance, was elected to the *Royal Society* at 26, became an articulate advocate of *Darwinism* as well as a great motivating force behind 20th century skepticism. Said mathematicians find deductions from general propositions. Biologists find general propositions from observation of particular facts.
- 1860 At a public meeting of the British Association for the Advancement of Science at Oxford on June 30 to discuss *Darwinism*, Bishop **Wilberforce** (coached by **Richard Owen**), **Benjamin Brodie**, **Joseph Hooker**, **Huxley**, and British American professor, **John W Draper** (see 1875), spoke. It was not a debate, just speakers with different views. Anglican Oxford, seeped in classical thinking, was preeminent in opposing scientific advances.
- Stephen Jay Gould: Knight takes Bishop** **Stephen Jay Gould's** (ref. 1859) *Knight takes Bishop*, is an authoritative narrative of the encounter. It says that **Wilberforce** had publicly said he would "smash" **Darwin**. *Origin of Species* had not mentioned humans. Nonetheless, according to eye-witness **Balfour Stewart**, **Wilberforce** said that he had been told that **Huxley** didn't care if his grandfather was an ape, that he (**Wilberforce**) wouldn't like to go to the zoo and find his father's father or mother's mother as an ape.
- Ape or Bishop?** **Huxley** spoke next, said, "If then the question is put to me, would I rather have a miserable ape as a grandfather or a man highly endowed by nature and possessed of great means and influence and yet who employs these facilities and influence for the mere purpose of introducing ridicule into grave scientific discussions, I unhesitatingly affirm my preference for the ape." The press called this, "I'd rather have an ape than a bishop for a grandfather."
- Christian reaction was fierce.** 1860 The audience was in turmoil. **Hooker**, a future president of the *Royal Society*, gave **Wilberforce** a scientific explanation, said he misunderstood **Darwin's** theory, could not have read *Origin of Species*, and was ignorant of the issues. Hooker won on science; Huxley won on style.
In the July 1860 *Quarterly Review*, Bishop **Wilberforce** published, anonymously, that *Natural Selection* was "absolutely incompatible with the word of God," that the fall of Adam explained different species, and **Darwin** was a "flighty person who endeavors to prop up his utterly rotten fabric of guess and speculation. . . and was utterly dishonorable to natural science."
- Avogadro accepted 50 years late.** Chemistry: Recall, in 1811 **Avogadro** had said that all atoms or molecules of every gas are the same size. In 1860, chemist **Stanislao Cannizzaro** (1826-1910) at a conference, convinced the delegates that **Avogadro**, then years dead, was correct.
- Cells are the elementary particles of all plants & animals.** Biology, botany, Cell theory: Recall, **Robert Hooke** in 1665 first saw and described cells and gave the first mention of cell theory. In 1839, **Matthias Schleiden**, (1804-81), German biologist, had noted that plants were made up of cells. **Theodor Schwann**, (1810-82), German physiologist saw cells in animal tissue. He and **Schleiden** concluded that all vegetable and animal tissue was essentially the same. They developed the theory that all cells were made up of a cell body with a membrane and a nucleus, and were the elementary particles of all plants and animals.
- Oxygen is the source of energy** The atom is to physics as the cell is to biology. In 1841, **Julius Mayer** had said that oxidation was the primary thermal source of energy for any living cell, plant or animal. Cells have trillions of atoms.
- Life comes from life** **Schleiden, Schwann, and Julius Mayer's** ideas only became part of the large known body of knowledge in 1860 (why it's here in this history) when **Louis Pasteur** (ref. 1857) showed that life comes from preexisting cells. (More **Pasteur** 1962)
- 1861 The White South seceded to protect owning Negroes** Civil War in the US: Slaves accounted for 50% of the US Southern states' wealth. In February, **Lincoln** had been elected but not sworn in. The anti-slavery movement had become strong in the Northern states and most Southern states had declared their secession from the US. The *ordinances of secession* of Texas, Alabama, and Virginia specifically blamed their plight of the "slaveholding states" at the hands of Northern abolitionists. South Carolina, Mississippi, Georgia, and Texas also declared that they seceded specifically because of the political movement to abolish slavery. .
- "Our new [Southern] government is laid on the great truth that the negro is not equal to the white man."** **Lincoln** was inaugurated on March 4th. Six days later, The Southern states met and adopted the *Constitution of the Confederate States*. Section 2 (1) said, "The citizens of each state shall be entitled to all the privileges and immunities and have the right of transit. . . with their slaves and other property; and the right of property shall not be thereby impaired.
In all [to be acquired] territory the institution of Negro slavery, as it now exists in Confederate states shall be recognized and protected by the Congress and by the territorial government."
Alexander Stephens, new VP of the Confederacy, said that "Slavery was the cornerstone of the

i.e., white
supremacy
outranks
nationalism,
science,
& equality.

foundation on which the new Confederate government was laid” and was the “immediate cause of. . . the revolution.” He said, “**Thomas Jefferson** and other founders were clearly in error when they argued that the enslaving the African violated the laws of nature. Nothing could be further from the truth.”
“Our new government is founded upon exactly the opposite view. Its foundations are laid upon the great truth that the negro is not equal to the white man.” In other words, white supremacy racism, was more important than the principles of nationalism, science, and the equality of humans.

To this day Southern apologists say states rights, not slavery, was really why Southern states seceded.

On April 12, Southern forces fired on Fort Sumpter, a Federal fort built to protect Charleston, South Carolina. The Civil War was on. 151 Confederate officers were West Point graduates.

The seceding states left Congress with a Republican majority. It then passed laws that promoted equality of opportunity, land grant colleges, homesteads for all, and tariffs that protected new industries.

Civil War The northern states had most of the industrial power. Some could afford to pay \$300 to avoid the draft. **J P Morgan, John D Rockefeller, Carnegie, James Mellon, Jay Gould** did so.

1861 Transcontinental telegraph: The East coast network of telegraph lines was connected to Omaha, then to Salt Lake City and Carson City, to the California network. It made the Pony Express obsolete.

1861 **Alexander 2** of Russia, fearing a revolt, freed serfs. It was symbolic. Serfs’ actual rights changed little. The **Stroganov** family owned 155,000 serfs and 10,000 square miles of land (larger than Vermont).

1861-62
**Sunlight
is electro-
magnetic
waves**

Electromagnetism: **Maxwell** (ref. 1855) published a mechanical model of the electromagnetic field. This addition completed **Maxwell's** equations. It was now easy for him to derive the wave equation and to note that the speed of electromagnetic wave propagation was close to the measured speed of light. So he correctly inferred that light goes in the same medium that causes electric and magnetic phenomena. He concluded that light was a form of electromagnetic radiation.(see 1867)

**On
Physical
Lines of
Force**

Based on **Faraday's** work (ref. 1831), **Maxwell** published *On Physical Lines of Force*. It reduced all knowledge of electricity to 20 linked differential equations. He said that visible light is only a tiny part of the electromagnetic spectrum and acts as a wave. **Huygens's** 1655 idea). This pretty much did in **Newton's** light-is-particles theory.

Maxwell said that a change in a magnetic field created an electric force and conversely, change in an electrical field created a magnetic force. **Maxwell** predicted that longer electromagnetic waves existed. (**Heinrich Hertz** confirmed this in 1887 when he discovered radio waves. (See 1887, more **Maxwell** at 1863, '73, '74, '81, and pp. 42r-30. The Full Electromagnetism Timeline is on pp.422-31).(In 1861, **Maxwell** also made the first color photos.)

**Turning
point**

Like *Principia*, discovering the nature of electromagnetic force was a turning point in the history of science. For the universe, gravity rules cosmology; electromagnetism rules the structure of atoms and molecules.

**Einstein
explained:
Faraday &
Maxwell
contradict
Newton**

Maxwell's Equations: **Einstein** later summarized **Maxwell's** significance, “Classical mechanics referred all phenomena, electrical as well as mechanical, to the direct action of particles on one another, irrespective of their distances from one another.

The simplest law of this kind is **Newton's** expression, “[Gravitational] attraction is proportional to the mass of one object times mass of another object divided by the square of their separation.”

**A new kind
of physical
reality, a
field of force**

“**Faraday** and **Maxwell** discovered an entirely new kind of physical reality, namely a *field* of force.” **Einstein** said **Maxwell's** theories were “the most profound and the most fruitful that physics has experienced since **Newton**.” **Maxwell's** electromagnetic waves were not immediately generally accepted as they were new and unproven. It took 25 years before **Hertz** (1857-1894) did so in 1887. The full *Electromagnetism Timeline* is on pp. 422-431)

**Not a force
acting at a
distance but a
field of force**

These new concepts gave the enormous advantage that, first, the concept of action at a distance, contrary to ordinary experience, is made unnecessary as the fields are part of space. Plus, the laws for the field, especially in the case of electricity, assume a much simpler form than if no field is assumed, and if only masses and motions are regarded as realities.”

**Fields are
now the
fundamental
qualities.**

Einstein: “What made [**Maxwell's**] theories revolutionary was the transition from forces acting at a distance to *fields* as fundamental qualities. Incorporating optics into electromagnetic theory, with its connection between the speed of light and the absolute

The first
fundamental
advance in
physics
since
Newton

electrostatic and electromagnetic systems of units, as well as the relation of the *Index* of refraction to the dielectric constant, and the qualitative connection between the reflection coefficient and the metallic conductivity of a body - it was like a revelation.”
Maxwell and **Faraday** were “the first fundamental advance in theoretical physics since **Newton**.”
Faraday said, “Nothing is too wonderful to be true if it be consistent with the laws of nature.”

1862
Spencer:
How
science
works

Epistemology: **Herbert Spencer** (ref.1850, ‘57, ‘59), in his book *Education*, said, “Science is organized knowledge.” (repeating **Kant**). “Science is the coexistence and consequences among phenomena; it groups these at first into generalizations of a simple or low order, and rising gradually to higher and higher and more extended generalizations.

A new theory
of evolution.
It applies to
cultures too

His book *First Principles of a New System of Philosophy* was a new theory of evolution. He said that all structures in the universe develop from a simple structures to complex structures, that this evolutionary process was universal, applying to the stars, galaxies, biological organisms, social organization, and to the human mind. He applied **Darwin’s Natural Selection** to cultures, not just to persons and animals. This book built on his 1857 book that applied biological processes to politics.

First
Principles

“Science has forced religion to give up one after another of its dogmas, those statements regarding the world it could not substantiate.” “Science thus trespassed on the province of religion, as it classed among the things which it comprehended certain forms of the incomprehensible.”
He used the phrase “survival of the fittest” to describe “*Natural Selection*.” Said it was the inevitable innate law of all things. **Darwin** liked it and began to use it rather than *natural selection*.

A savage’s
worship is
like modern
priests
worship

Spencer: “The *Veddah* [a primitive race in Ceylon/Sri Lanka] thinks that failure to hit an animal with his arrow resulted from inadequate invocation of an ancestral spirit. The Catholic priest who says prayers over a sick person in the expectation that . . . the disease will be so stayed, differ only in respect of the agent from whom they expect supernatural aid.” (Recall, **William Jennings Bryan**, “One miracle is just as easy to believe as another.”) (more **Spencer** 1870s, p. 396)

1862
Lord Acton

Catholicism: **John Emerich Edward Dahlberg** / Lord **Acton** /First Baron **Acton** (1834-1902), friend of PM **Gladstone**, denied admission to Cambridge as a Catholic. **Acton’s** journal, *Home and Foreign Review*, said the 18th century adventurer and bisexual **Pier Farnese** was Pope **Paul 3’s** son. The custom was to call popes’ sons *nephews*. Vatican hostility killed the *Review*. (more 1870, ‘87)

1862
Natural
History of
Creation
outsold
Origin of
Species

Darwinism defended: **Ernst Haeckel’s** (1834-1918), German, zoologist, philosopher, marine biologist, eugenicist, naturalist, physician, wrote *The Natural History of Creation* popularizing *Darwinism*. It was more widely read than **Darwin’s** detailed and technical *Origin of Species*.
He said *Darwinism* represented a new cosmic philosophy that showed that inevitable change was the principal mechanism at work in history. *Darwinism* united **Hegel’s** idealism and German *Romanticism* and united humans and nature. (more **Haeckel** 1901)

Civil War

In December, President **Lincoln** said, “In all ages some have labored, and others, without labor, have enjoyed a larger proportion of their fruits. This is wrong. This wrong should not continue To secure for each laborer the whole product of his labor is a worthy object of any good government.”

Germ theory
started
modern
medicine.

Medicine: **Louis Pasteur** (ref 1856, ‘60) and others had found that specific microorganisms caused specific diseases and that bacteria could be killed by heat and disinfectant. **Pasteur** also improved the technique of inoculation (1796 **Jenner**) to immunize animals. He published *The Germ Theory of Disease*, the most important single advance in the history of medicine. It started modern medicine.

1863
J S Mill
Utilitarianism

Philosophy: **John Stuart Mill** (ref.1851, ‘59) said *Origin of Species* had created a social environment in England sympathetic to a secular approach to morality. It prompted him to write *Utilitarianism*. It said, “Pleasure and freedom from pain are the only things desirable as ends.” “Cultural, intellectual, and spiritual pleasures are of greater value than mere physical pleasure, because they would be valued more highly by competent judges.” “Better to be a **Socrates** dissatisfied than a fool satisfied.”

The ethics of utilitarianism influenced a large number of public men and helped shape important reform laws. **Mill** argued that induction (not deduction) works well due to the uniformity of nature.

Mill also argued against slavery. He opposed statistical probability arguments in science or social science. And, “A cultivated mind is one to which the fountains of knowledge have been opened, and which has been taught, in a tolerable degree, to exercise its facilities.”

1863
**Antiquity
of Man**

Geology: Sir **Charles Lyell** (ref.1830-33), England's foremost geologist, changed his mind and endorsed **Darwin's** fundamental ideas. He published *Geological Evidences of the Antiquity of Man*. It validated *Darwinism* among educated people and was a blow to anti-Darwinists

**Jesus was a
very good
man but not
divine.**

Philosophy: **Ernest Renan's** (1823-90) *Life of Jesus*, widely read, praised **Jesus**, said he was the pinnacle of humanity, his genius and moral teaching changed the world, but he was not divine. This was ethical humanism without clergy that appealed to many educated persons. He said miracles were only reported where people were disposed to believe in them. "No miracle has ever taken place under conditions science can accept." (like **Hume**)

**Humans
are stupid**

He said, "Religion is necessary to morality. Religion is a necessary imposture. Even the most obvious ways of throwing dust in people's eyes cannot be neglected when you are dealing with a race as stupid as the human species." "Judaism has really conquered the world through Christianity. Christianity is the masterpiece of Judaism, its glory and the fullness of its evolution."

**Civil War
Lincoln**

Political Theory, slavery: **Abraham Lincoln's** *Emancipation Proclamation* freed slaves but only in the Confederate states in revolt.. He dedicated the Gettysburg National Cemetery which buried the dead from the largest and deadliest battle of the war. After long dull speeches, **Lincoln** spoke,

**Gettysburg
Address**

"Four score and seven years ago our fathers brought forth upon this continent, a new nation, conceived in liberty, and dedicated to the proposition that all men are created equal. . . This we may, in all propriety do. But in a larger sense, we cannot dedicate, we can not consecrate- we can not hallow this ground - the brave men living and dead, who struggled here, have hallowed it, far beyond our power to add or detract.

**Government
of, by, & for
the people
shall not
perish from
the Earth**

- The world will little note nor long remember what we say here; while they can never forget what they did here. It is rather for us, the living, we here be dedicated to the greatest task remaining before us -that, from those honored dead we take increased devotion to that cause for which they here, gave the last full measure of devotion - that we here highly resolve these dead shall not have died in vain, that the nation shall have a new birth of freedom, and that government of the people, by the people, for the people, shall not perish from the Earth."

The phrase "Government of the people, etc" had been used by Senator **Daniel Webster**, and was like phrases of **John Wycliffe** (ref.1376), **Disraeli**, and Boston minister **Theodore Parker** (ref.1850s).

Lincoln freed slaves (only in Confederate states). Inequality of wealth and power continued everywhere. Like most humans worldwide, the vast majority of persons were poor and illiterate.

Speaking to a labor union, **Lincoln**, although he had represented corporations in his law practice, said, "I know the trials of working men, and I have always felt for them. I know that in almost every case of strikes, the men have a just cause for complaint." **Lincoln** was not so solicitous toward American Indians. In 1863, he ordered the confiscation of two Western Indian tribes's land.

1863
**Baha'i,
a gentle
religion**

Religion: **Mirza Husayn 'Ali Nuri, Bahá'u'lláh** (1817–1892), Persian, in 1863, announced his prophethood for himself and his family, developed the monotheistic Bahá'í faith. It emphasized the spiritual unity of all mankind. Its three core principles were the unity of God, the unity of religion, and the unity of mankind. Baha'i teaches gender equality, elimination of all forms of prejudice, world peace, harmony of religion and science, independent non-theological investigation of truth, compulsory education, universal auxiliary language, obedience to government, end extremes of wealth and poverty.

Baha'u'llah adherents consider other religions as manifestations of God who brought teachings suitable for their time. Baha'u'llah fulfills the end-time prophesies of earlier scriptures.

The purpose of life is spiritual growth through an organic process that continues after death. God is too great for humans to fully comprehend.

1863
**Evidences
as to Man's
Place in
Nature**

Biology: **Huxley's** *Evidences as to Man's Place in Nature* was the first clear statement that humans evolved from ape-like creatures. "Man differs less from the chimpanzee or Orang, than even these do from the monkeys, and that the difference between the brains of the chimpanzee and of humans is almost insignificant." "Extinguished theologians lie about the cradle of every science as the strangled snakes beside that of Hercules." "Scientific investigation is nothing but the expression of the necessary mode of working of the human mind." "The man of science has learned to believe in justification, not by faith, but by verification." **Huxley** said that the average Negro was inferior to the average white man but opposed any form of discrimination.

1864
**Essays and
Reviews**

Anglican Fear of Dissent: Anglicans brought heresy charges against two of the seven authors of the 1860 *Essays and Reviews*. Many Anglican clergy asked the bishop judges to “save Christianity” by punishing the authors. Archdeacon **George Anthony Denison** insisted on severe punishments “for the sake of the young, thrust almost to Hell by the action of this book.” The eminent Rev. Dr. **Philip Pusey** entreated the Bishop of London, a judge in the trial, of the evil consequences of an acquittal. But, the panel of bishops acquitted the two accused authors on relatively narrow technical grounds.

**Bible errors
put the
whole Bible
in doubt**

A fire storm of protest arose. 11,000 Anglican clergy signed the *Oxford Declaration*. It said, “If any part of the *Bible* was seen to be in error, then the whole of it could be called into doubt.” They were right. Various passages in the *Bible* *did* seem to be in error. For example, the Earth was created in six days *Gen. 1:1-31* as well as in an instant. *Gen. 2:4*. God made woman from Adam’s rib.

**probable
Bible errors**

Some men lived hundreds of years. The Red Sea parted. The Sun orbits the Earth. Five loaves of bread and two fish fed 5,000 people. God created all species separately. **Jesus** walked on water.

The *Bible* talks about a talking snake, a tree whose fruit gives one knowledge, a voice from a burning bush, a talking donkey, rods turning into serpents, persons rising from being dead, disembodied fingers writing on a wall. Devils who crawl out of people saying **Jesus** is the son of God. Mutes who are possessed by devils. Faith felled Jericho’s walls. An ass argued with his master. There are more. The *Qur’an* and *Book of Mormon* have equivalent problems.

**England
would be
better off
if people
were more
bigoted in
their
religion**

Christianity: **John Henry Newman** (1801-90), Brit, an Anglican priest, wrote, “We must deal with the Catholic Church as we would towards a deranged friend, with affection.”

But, in 1843, he retracted his anti-Catholic writings and converted to Catholicism. In 1864, he wrote, “It would be a gain to [England] were it vastly more superstitious, more bigoted..more fierce in its religion.” The Catholic Church holds that it would be better for sun and moon to drop from heaven. . . and for [everyone on Earth] to die of starvation. .than that one soul. . . should commit one venal sin, or tell one untruth,. . .or steal one farthing.”

And, “The Catholic Church claims not only to judge infallibly on religious questions, but to [critique] on secular matters which bear upon religion, on matters of philosophy, of science, of literature of history, and it demands our submission to her claim.

He became a Catholic priest, then in 1879 a cardinal and in 2019 named as a saint. (More 1872)

1864
Disraeli

Politics: **Benjamin Disraeli**, (ref. 1837) a future prime minister, said, “Is Man an ape or an angel?.I am on the side of the angels. I repudiate with indignation and abhorrence those newfangled theories.” Some scientists opposed **Darwin**, principally as he had not explained the *mechanism* of species change.

1865
**Mill:
if you say
something
stupid, say
it’s
religious.**

Politics: From 1865-68, **John Stuart Mill** (ref. 863) urged easing England’s disgraceful treatment of Ireland (see 1798, 1829, ‘47-49). Said, “Every established fact which is too bad to have any other defense, is given as a injunction of religion.” Said that “the logical process of Induction worked well due to the uniformity of nature.” He argued for individual rights and tolerance of unpopular ideas and groups like labor unions and farm coops. He was the first member of Parliament to advocate women voting.

1865 **P T Barnum’s** *Humbugs of the World* debunked psychics, medical, and media hoaxes, and fake haunted houses. Attributed to **Barnum**, “There’s a sucker born every minute.”

1865
**Christians
vs. Darwin**

Christians continued to attack Darwinism: The Protestant *Victoria Institute* was founded to combat evolution. Its Rev. **Walter Mitchell** said, “*Darwinism* endeavors to dethrone God.” Catholic cardinal **Wiseman**, said, “Now it is for the Church, which alone possess divine certainty and divine discernment, to place itself at once in the front of a movement which itself threatens even the fragmentary remains of Christian belief in England.” **Henry** Cardinal **Manning** called evolution “a brutal philosophy—to wit, there is no God, and the ape is our Adam.” **Manning banned** slavery nationwide in 1865 for Catholics.

1865
**The Civil
War ended.
Slavery
outlawed**

US Civil War: Around 800,000 died In the war. The industrial North won despite massive profiteering. Before 1861, the whole US had 20 millionaires. By 1863, New York City had over 100, all due to government spending. Congress freed *all* slaves nationwide. (England had ended the slave trade in 1808 and In the Caribbean in 1833. France did so in 1838. The Dutch ended their Atlantic slave trade in 1814 but slavery continued in Dutch colonies until 1863. The legal abolition of slavery in most, not all, countries was the 19th century’s greatest social achievement.

1865
**War and
Peace**

Ethics: Count **Leo Tolstoy** (1828-1910), Russia’s greatest writer. His *War and Peace* described **Napoleon’s** disastrous 1812 invasion through the lives of five aristocratic military families. There are marriages, ornate balls, separations for military service, calculating parents, frequent loves

Tolstoy: How shall we live?	and infidelities, rebellious peasants. It described the psychological effects of the war and the philosophical discussions it fueled. Simple patterns of social behavior have vast consequences. Characters change and affect those around them which eventually changes the historical framework of the nation.
Historians call the biggest killers "great"	Tolstoy said, "When actions are all contrary to all that humanity calls right or even just, the historians [call the actor] 'great'. "Greatness" exceeds all the standards of right and wrong. There is no atrocity for which a "great" man can be blamed. <u>Science is meaningless because it doesn't answer our only important question, 'What shall we do, and how shall we live?'</u> (More 1898, 1908, '57)
	<u>Anglican Fear of Dissent:</u> Bishop John Colenso said the <i>Pentateuch</i> (the first five books of the <i>Hebrew Bible</i>) reputedly written by Moses , was self-contradictory, as it had Moses passages referring to events centuries after Moses . Hobbes and others had said the same. Anglicans excommunicated Colenso .
	1865 <u>Racism in America:</u> Historian Heather Cox Richardson , "White supremacists retook control of Southern states. They began passing " <i>Jim Crow</i> " laws to discriminate harshly against Negroes. Between 1865-1900, racism, sexism, and greed divided Americans. Whites actively excluded Blacks, Indians, immigrants, and organized laborers from the benefits of reconstruction. Confederate veterans founded the Ku Klux Klan, a Protestant-led extremist, white supremacist, far-right hate group. It used terrorism, violence and acts of intimidation on Negroes, Jews, and Catholics and their political enemies, principally but not exclusively in the South.
Rise and influence of the Spirit of Rationalism in Europe	<u>History:</u> William E H Lecky (1838-1903) Irish, historian, essayist, and political theorist. wrote <i>History of the Rise and Influence of the Spirit of Rationalism in Europe</i> . " <u>Every great change of belief was preceded by a great change in the intellectual condition of Europe; the success of an opinion depended less upon the force of its arguments than on the predisposition of society to receive it.</u> " His book was a terrifying account of the widespread stranglehold that belief in sorcery and witchcraft had on the peoples of Europe before the Reformation. He attributed the belief in witchcraft to "the general [religion based] predisposition to see Satanic influence in life."
Catholicism: enquiry is sinful	Catholicism, Lecky: " <u>The period of Catholic ascendancy was on the whole one of the most deplorable in the history of the human mind. The spirit that shrinks from enquiry as sinful and deems a state of doubt a state of guilt, is the most enduring disease that can afflict the mind of man.</u> "
Lecky Quotes	" <u>Not till the education of Europe passed from the monasteries to the universities, not til Mohammedan science, and classical free thought, and industrial independence broke the sceptre of the Church, did the intellectual revival of Europe begin.</u> " "In proportion to its power, Protestantism has been as persecuting as Catholicism. . . <u>There is no wild beast as ferocious as Christians who differ concerning their faith.</u> "
Reformation emancipated the human mind	Lecky: " <u>The Reformation contributed largely to the emancipation of the human mind from all superstitious terrors. . . It rejected an immense proportion of the dogmatic and ritualistic conceptions that had almost covered the whole field of religion, and rendered possible the steady movement by which theology has since then been gravitating towards the moral faculty.</u> "
Lecky: Reformation was painful for the human intellect	[The Reformation] <u>above all, diminished the prominence of the clergy, and thus prepared the way for that general secularization of the European intellect</u> , which is such a marked characteristic of modern civilization. . . . Yet, for a time, the Reformation aggravated the very evils it was intended to correct. It was, for a time, merely an exchange of masters (as Huxley said in 1893). . . The Reformation was. . . the most painful of all the transitions through which the human intellect has passed."
Dostoevski: One inevitably pays for his crimes	<u>Psychological Realism:</u> Fyodor Dostoevski (1821-81) Russian, out of exile for political crimes, published <i>Crime and Punishment</i> One inevitably pays for his crimes against his fellow humans by suffering, which suffering may purify him. The main character is a sensitive intellectual driven by poverty to think he is exempt from moral law. He killed someone not to rob but as an experiment.(also 1880-Karamazov)
The teaching monks were not allowed to teach biology 1865	<u>Genetics:</u> Gregor Johann Mendel : (1822-84), a Moravian monk, at a teaching order abbey in Brunn, Austria (now Brno, Czech Republic), whose bishop forbade the monks from teaching biology, after eight years of experiments in his garden concerning heredity, discovered that certain traits in plants were controlled by one of a pair of entities (later called genes), from one or the other parent. (More, 1900, '32) <u>He discovered the laws of heredity.</u> Mendel published <i>Versuche uber Pflanzen-Hybriden</i> / <i>Experiments in Plant Hybridization</i> in the obscure <i>Journal of the Brunn Natural History Society</i> .
1866	Clergy criticized Mendel's findings as Darwinian. He received favorable notice in the <i>Encyclopedia</i>

- Genetics** *Britannica*, but not by scientists in general. He turned to other studies. He became Abbot. The Church disfavored his scholarship, so on his death in 1884, the monks in his monastery burned all his papers. His work only became generally known in 1900 when Hugo de Vries published his theory of heredity and “genes” that mutate. (See 1900-**Mendel** for detail of the laws of heredity.)
- Pius 9, Slavery is OK with divine law** Christianity: Pius 9 (1792-1878), who had put Rome’s Jews in a ghetto, citing the *Bible*, said, “Slavery is not at all contrary to Divine law.” The Church played little part in abolishing slavery. **Pius 9** preferred a monarchy to fight heresy. Even the London periodical *Saturday Review* criticized the “willful inability of the *Curia* in Rome to concede the advances of modern science, in particular **Galileo’s** discoveries and insights.” Clericalism became synonymous with obscurantism.
- 1867 Light is electro-magnetic waves** Electromagnetism: Maxwell’s (ref. 1861-62) *A Dynamical Theory of the Electromagnetic Field* said “Light and magnetism are variations of the same substance, so light [travels] according to electromagnetic laws,” He built on the ideas of **Faraday** and unified magnetism with electricity; he said that electricity, light, and magnetism, were all electromagnetic waves of different wavelengths. (fuller discussion at 1867 in the *Electromagnetism Timeline*.)
- Antiseptic Surgery** Medicine, Antiseptic Surgery: Joseph Lister a young surgeon in a Glasgow hospital, saw many persons undergoing surgery became infected and died. A chemistry professor showed him an article by **Louis Pasteur** on putrefaction and fermentation of wine. He concluded that there should be some substance that killed the germs that caused infection. He learned that carbolic acid, a new German invention, was a disinfectant. He obtained a supply and used it in treating his surgery patients. It prevented infections. He described it in the medical journal, *Lancet*.
- Carbolic acid** He wrote, “in the last nine months not a single instance of pyemia, hospital gangrene, or erysipelas, has occurred in [his surgery patients].” The use of carbolic acid slowly caught on, principally among younger surgeons, and is recognized as beginning a new era in medicine. He is now famous in medicine.
- 1867 Physics Treatise** Physics: William Thomson (ref. 1802, ‘43, ‘46, ‘48 ‘51, ‘53) and **Peter Tait** (1831-1901) published *Treatise on natural philosophy*. It established the behavior of particles in terms of kinetic energy, potential energy, and the conservation of energy as the heart of physics. (More **Thomson** 1892, pp.426, 429)
- Syllabus of Errors** Catholicism: Pope Pius 9 published *Syllabus of Errors*. It condemned democracy and said “that pernicious and insane opinion that liberty of conscience and of worship is the right of every man.”
- Pius 9** cited 80 “errors” concerning Catholicism, namely 1. statements favoring freedom of speech and thought. 2. the right to choose one’s religion. 3. pantheism. 4. socialism. 5. secular education, 6. civil marriage. 7. statements saying that the church ought to be separate from the state. 8. that Protestant religions are Christian, and 9. that human reason is the sole arbiter of truth and falsehood.
- Pius** told parents to send their children to Catholic schools. *Syllabus* embarrassed educated Catholics. Even a Spanish journal regretted the obstinacy and blindness of the pope to condemn modern civilization.
- Horatio Alger stories inspired teens 1867** Moulding the American Mind: Horatio Alger (1832-99), a sometime Unitarian minister and prolific writer, after years of failure as a writer, finally found a successful theme with books about honest, hardworking, diligent, American boys who pulled themselves up from poverty to prosperity and respectability.
- His breakthrough book was *Ragged Dick*. He was enormously influential in defining the American character and his books sold millions for decades. He wrote at least 100 books with his common theme.
- Das Kapital The ruling class’s exploitation of labor is the motivating force of capitalism.** Economic theory, capitalism: Karl Marx’s Das Kapital Kritik der politischen Ökonomie replied to **Adam Smith’s** *Wealth of Nations* with a comprehensive study of the exploitation of labor by the unregulated capitalism of the industrial revolution.
- Marx** argued that the motivating force of capitalism was the ruling class’s exploitation of labor, whose work creates surplus value i.e., profit. He saw slavery as a key ingredient in capitalism.
- Said, “Without slavery, you have no cotton; without cotton you have no modern industry. (Cambridge’s *History of Capitalism* (2014) and **Sven Beckert’s** *Empire of Cotton* agree.)
- John Stuart Mill** said, “War is an ugly thing, but not the ugliest of things: The decayed and degraded state of moral and patriotic feeling which thinks nothing is worth a war is worse.”
- As a member of Parliament, he said, “I did not mean that Conservatives are generally stupid; I meant that stupid persons are generally conservative. I believe that to be so obvious and undeniable a fact that I hardly think any honorable Gentleman will question it.” (More **Mill** 1869, ‘74)
- 1868 Paleontology:** Remains of what became named Cro-Magnon Man, a truly modern man, *Homo sapiens*,

Cro-magnon man	were discovered in the Dorgone region of SW France. The remains showed Cro-Magnon tribes lived in caves and shelters, were primarily big game hunters, <u>had fishing and hunting tools, made footwear, used fire, had a kiln and rites and ceremonies.</u> They painted scenes of the hunt on cave walls in the Dorgone.
1868 Redshift Blueshift	Astronomy: William and Margaret Huggins , Brits, used Fizeau's 1848 explanation of the redshift-blueshift phenomenon of light's electromagnetic waves to determine how fast stars were receding from Earth. They also examined the spectra of <i>nebulae</i> (groups of stars) to determine what elements were in the nubulae. By analyzing various stars' spectra, they could distinguish between <i>stars</i> made mostly of gasses and dust and solid stars.
Atoms	Chemistry: John Newlands and Alexander Beguyer de Chancourtois c.1860 saw repeat patterns of characteristics of elements when arranged by <i>weight</i> , then the only way to distinguish one substance from another. (Atomic weight is the weight of all the parts of an atom, i.e., protons, neutrons, electrons). Atoms of elements were then considered the smallest particle of matter.
1869 Periodic Table of Elements	Chemistry: Periodic Table of Elements: Dmitri Mendeleev (1834-1907), Russian, also recognized patterns among the elements by their weight. He constructed a <i>Periodic Table of Elements</i> (of 63 then known elements) showing families of elements. He organized elements by their atomic <i>weight</i> , and their characteristics.
Periodic Table corrected	Chemistry, Periodic Table of Elements: No scientist was then aware that atoms had tinier particles, now called sub-atomic particles.) But, relying on the apparent regularity of those elements he knew, Mendeleev predicted properties of elements not yet discovered which filled in gaps in his <i>periodic table</i> . (In 1914, after more was known, the table was organized by atomic <i>number</i> (protons only) (See 1914). Electrons were the first sub-atomic particles discovered (1897), then protons (1917) , neutrons (1932).
1869 More Christian attacks on Darwin.	Continuing Christian attacks on Origin of Species: Dr. Charles Perry , Lord Bishop of Melbourne, in <i>Science and the Bible</i> , wrote, "The object of Chambers, Huxley, and Darwin was "to produce a disbelief of the <i>Bible</i> ." French Monseigneur Louis Segur: Darwin's doctrines "come from Hell." German Lutheran theology professor at Leipsig Christoph Ernst Luthardt: "The idea of creation belongs to religion and not to natural science. <u>The whole superstructure of personal religion is built on the doctrine of creation.</u> "
"Creation belongs to Christians"	German Dr. Schund , "if Darwin be right saying man developed out of a brutal condition, then the <i>Bible</i> teaching in regard to man is totally annihilated." <u>The <i>Metaphysical Society</i> of scientists and clerics was formed to "unite all shades of religious opinion against materialism."</u> The society dissolved in 1880 as, according to Tennyson , they couldn't define metaphysics.
1869 Subjection of women	Political Theory, women's rights: John Stuart Mill , (ref 1835, '51, '59, '63) with his brilliant wife, Harriet Taylor (1807-58), wrote <i>On the Subjection of Women</i> . Said, "The influence of priests over women is attacked by Protestant liberal writers less for being bad in itself than because it is a rival authority to the husband, and raises up a revolt against his infallibility." "After the primary necessities of food and clothing, freedom is the first and strongest want of human nature."
1869 Eugenics	Biology, eugenics: Sir Francis Galton (1822-1911), a polymath, a half-cousin of Darwin , created the statistical concept of correlation and widely promoted regression toward the mean. He was the first to use statistics in the study of human differences and inheritance of intelligence. <u>He founded the field of <i>behavioral genetics</i>, the hereditability of behavior.</u>
One's will is biologically determined; it isn't free	He reasoned that if humans evolved, then mental and physical facilities must be hereditary, and, as we use those facilities to make decisions, our " <i>will</i> " is a product of our inherited characteristics. <u>So our ability to make "free" choices is determined by our biological inheritance.</u> This diminished the then prevailing religious view of complete <i>free will</i> (complete moral responsibility, ref. pp 196-198). It was one of the first studies of the brain. (See pp. 396-400 for factors that hinder clear thinking.) Galton proposed to use selective mating to create a race of superior persons. This is eugenics. He coined the phrase <i>nature vs. nurture</i> as the two prevailing theories of the causes of a person's characteristics. He chose nature, i.e., heredity. Darwin came to agree with him.
1869 Railroads across America	Geography: The railroad across America (largest industrial project ever) and Suez Canal were completed. The world got smaller. The Central Pacific Railroad was constructed from Sacramento going east. It spent \$200,000 in bribes in Washington and got 9M acres of free land. It employed up to 12,000 Chinese (paid \$1 per day) and 3,000 Irish laborers (\$2 per day).

The Union Pacific built West from Nebraska with 12M free acres. (50% bigger than Maryland). Shares were sold cheap to Congressmen who helped the authorization.

Chinese immigrants to the U S, South Africa, and Australia were mistreated as badly as Blacks throughout their history. See 1889).

Agnostic: **Philosophy: Thomas Huxley** (ref.1855, '60) coined the term "agnostic" to describe his philosophy. Said, "It is wrong to say that one is certain of the truth of a proposition unless he has evidence which logically justifies that certainty. That is all that is essential to agnosticism." [or any scientific proposition]. Agnosticism is not an alternative to atheism as it is concerned *not* with beliefs, but with the *possibility* of beliefs.

An ugly fact slays a beautiful hypothesis Atheistic agnostics say that the *existence* of a god is unknowable. Theistic agnostics say God may exist but if so, his *nature* is unknowable. **Huxley** said, "The great tragedy of science: the slaying of a beautiful hypothesis by an ugly fact" "Science is simply common sense at its best; that is, rigidly accurate in its observation and merciless to fallacy in logic." (1880). "The chess board is the world, the pieces are the phenomena of the universe, the rules of the game are what we call the laws of Nature."

Huxley Quotes "Make up your mind to act decidedly and take the consequences." "No good is ever done in this world by hesitation." "There is no greater mistake than the hasty conclusion that opinions are worthless because they are badly argued." "The great end of life is not knowledge but action."
Skeptic "I am too much of a skeptic to deny the possibility of anything."

"Every great advance in natural knowledge has involved the absolute rejection of authority."
"Science . . . warns me to be careful how I adopt a view which jumps with my preconceptions, and to require stronger evidence for such belief than for one to which I was previously hostile."

Thomas Huxley Quotes "My business is to teach my aspirations to conform . . . to facts, not to teach facts to harmonize with my aspirations. Regarding meritocracy, I should be very sorry to find myself on board a ship in which the voices of the cook and the lolbolly boys counted for as much as the officers
1869 on a question of steering or reefing topsails. Sit down before fact as a little child, be prepared to give up every preconceived notion..or you shall learn nothing."

The saying that a little knowledge is a dangerous thing is. . .a very dangerous adage. If knowledge is real and genuine,. . .it is. . .a very valuable possession, however infinitesimal it may be. Indeed, if a little knowledge is dangerous, where is the man who has so much as to be out of danger?

Thomas Huxley Quotes "It is an error to imagine that evolution signifies a constant tendency to increased perfection. That process undoubtedly involves a constant remodeling of the organism in adaptation to new conditions; but it depends on the nature of those conditions whether the directions of the modifications effected shall be upward or downward." "Science commits suicide when it adopts a creed." "Irrationally held truths may be more harmful than irrational errors as errors can be corrected by better reason." (Once you call something a "truth," it can't be changed.) "A man's worst difficulties begin when he is able to do what he likes." **Huxley** considered Blacks an inferior race, then a common belief.

H L Mencken: All of us owe a vast debt to **Huxley**, especially all of us of English speech, for it was he, more than any other man, who worked that great change in human thought which marked the 19th Century.

1870 **Philosophy: Mark Twain**, pen name of **Samuel Clemens** (1835-1910), was America's most popular and influential author, philosopher, also the greatest satirist and humorist, was essentially a realist. He had been a prospector, reporter, printer, lecturer, and river boat pilot.

Mark Twain quotes "Faith is believing what you know ain't so." "The *Bible* is a mass of fables and traditions, mere mythology. "The Bible is full of interest. It has noble poetry in it; and some clever fables; and some blood-drenched history; and some good morals; and a wealth of obscenity; and upwards of 1,000 lies." "Man is a marvelous curiosity. He thinks he is the Creator's pet. He even believes the Creator loves him."
When in doubt, tell the truth "It ain't what you don't know that gets you in trouble. It's what you know for sure that just ain't so."
"When in doubt, tell the truth." "A person who doesn't read has no advantage over a one who cannot"
"There is not an acre of ground on the globe that is in possession of its rightful owner, or that has not been taken away from owner after owner, cycle after cycle, by force and bloodshed."
"Let me make the superstitions of a nation, and I care not who makes the laws or its songs."

Mark Twain quotes "Prosperity is the surest breeder of insolence I know. "What is the chief end of man?— to get rich. In what way? —dishonestly if he can; honestly if he must." "The easy confidence with

which I know another man's religion is folly teaches me to suspect that my own is also."
"Man will do many things to get himself loved; he will do all things to get himself envied."

Vatican One
"One man, one vote?"
1870 **Catholic Dogma:** Pope **Pius 9** convened the *First Vatican Council*. He wanted to have the pope declared infallible. The makeup of the Council had an imbalance **of conservative Italian and Spanish bishops**. Specifically, 700,000 Catholics in Roman states had 62 bishops/votes, whereas 1.7M Poles from the more liberal Breslau had one bishop/vote, a 150 to 1 disparity. Critics said the papacy was run for the benefit of a few rich Italian families. Italians had about 16% of Catholics but had 73% of its cardinals (a 4.6 times disparity). The *Curia* was more disproportionate.

Infallible pope hated democracy
Lord **Acton** with the Austrian prime minister, the Prussian ambassador, the French government, and several cardinals all tried to prevent the infallibility decree being adopted. With his bishops from Papal states, **Pius 9** caused the *Council* to vote that the pope is infallible in matters of faith and morals. This infallibility decree was widely disdained (but reaffirmed in 1963).

Pius 9 hated democracy. (ref.1864) So The Council condemned democracy, modernism, capitalism, Marxism, and usury, reaffirmed that God wrote the Bible, and that faith overrules reason.

1870 **Lewis H Morgan** (1818-81) showed that most humans were in one of two distinct modes of determining kinship. In 1877, he described three *Grand Epochs* of Man's progress, Savagery, Barbarism, Civilization.

1870 **Germany:** Prussia's chief of staff, General **von Moltke**, said, "War is a necessary part of God's order." Germany soon united under **Otto von Bismark**. Its constitution gave equal rights to Jews.

Democracy: **Walt Whitman** (1819-92), to serve America, he exposed its weaknesses, liabilities, corruption.

"Man is descended from a hairy, tailed quadruped, probably arboreal in its habits"
1871 **Evolution:** **Darwin** published *The Descent of Man* (twice as long as *Origin of Species*) solely to make explicit that "There is no fundamental difference between man and the higher animals." "Man is descended from a hairy, tailed quadruped probably arboreal in its habits. We must however acknowledge, as it seems to me that man with all his noble qualities . . . still bears in his bodily frame the indelible stamp of his lowly origin."

"I would as soon be descended from (a) baboon. . .as from a savage who delights to torture his enemies. . . treats his wives like slaves . . . and is haunted by the grossest superstitions."

"Man and chimpanzees are both descended from an earlier primate and are equally evolved."

Ignorance more frequently begets confidence than does knowledge. It is those who know little, not those who know much, who so positively assert that this or that problem will never be solved by science."

Descent was largely concerned with Man's behavior. "False facts can hinder the progress of science, for they often endure long; but false opinions, if supported by some evidence, do little harm, for scientists like to refute falsehoods; and when this is done, one path towards error is closed and the road to truth is often opened." **Herbert** (ref.1852, '59, '62, '64) had used the word "evolution" to describe **Darwin's** phrase, "descent with modification." **Darwin** liked "evolution" and began using it.

"Those primitive ancestors who were the wisest, used weapons and traps best, and who could best defend themselves, had the most children. Races evolved due to sexual selection, not Natural Selection."

Eugenics **Darwin** understood the eugenic implications of *Natural Selection*, "With savages, the weak in body or mind are soon eliminated. We civilized men [try to keep all humans alive]. Vaccination has preserved thousands who from a weak constitution [would have died]. Thus the weak propagate their kind. . .this must be highly injurious to the race of men." [When all, even the "unfit," survive, it is more accurate nowadays to say "survival of those who breed the most."]

Darwin said the misery in the world refutes the Design Argument
Regarding the *Design Argument*, **Darwin** said, "I own that I cannot see as plainly as others do, and as I should wish to see evidence of design and beneficence on all sides of us. There seems to me too much misery in the world. I cannot persuade myself that a beneficent and omnipotent God would have designedly created the *Ichneumonidæ* (a tiny insect) with the express intention of their feeding within the living bodies of caterpillars, or that a cat should play with mice."

"I feel most deeply that the whole subject is too profound for the human intellect. A dog might as well speculate on the mind of **Newton**. Let each man hope and believe what he can."

Problem of Suffering
1871 **Darwin** went further. He wrote that the *Old Testament* "was no more to be trusted than the sacred books of the Hindoos or the beliefs of any barbarian." He also had trouble with a God who stood by and watched suffering, said, "It revolts our understanding to suppose that [God's]

benevolence is not unbounded.” (A beloved daughter of **Darwin** had died at 10).

1871 **Darwin** said, “Freedom of thought is best promoted by the gradual illumination of men’s minds which follows from the advancement of science.” And, “The mystery of the beginnings of all things is insoluble by us; and I for one must be content to remain an agnostic.” When he died in 1882, he was buried next to **Newton** in Westminster Abbey; **Lyell** was buried nearby.

Christians attacked Descent of Man The Christian establishment again attacked, called **Darwin’s** new book “utterly unsupported hypothesis,” “Reckless and unscientific,” said **Burgon**, Dean of Chichester. “Those who refuse to accept [biblical] creation. . . cause the entire scheme of man’s salvation to collapse.” The magazine, *Family Herald*, stated, “Society must fall to pieces if *Darwinism* be true.” The Rev. **T R Birks**: Evolution is “flatly opposed to the fundamental doctrine of creation.” He was right.

Victorians didn’t like monkey ancestors A contemporary historian, **Ernst Mayr**, wrote, “No Darwinian idea was less acceptable to the Victorian than the derivation of Man from a primitive ancestor.” A modern scientist, **Matt Ridley**, said, “If you think being descended from apes is bad for your self esteem, then get used to the idea that you are also descended from viruses.” see more **Ridley**, 1973)

1870-01 **Victor Emmanuel 2** (1820-78), king of Sardinia and Italy, defeated Rome freeing the Papal States from Catholic control and unified Italy. He freed Rome’s remaining Jews from **Pius 9’s** ghetto. So he was excommunicated. He allowed **Pius 9** the use of, but not sovereignty over, Vatican City.

Possible flaw in theory of natural selection Biology: Biologist **George Mivart** (1817-1900) articulated a seemingly significant flaw in **Darwin’s** *Natural Selection*. In his book *The Genesis of Species*, he agreed that *Natural Selection* did show that incremental changes could increase an organism’s fitness to survive (making a wing bigger, legs longer, more efficient ears), but couldn’t explain how a wing started in the first place. This is now known as *the problem of irreducible complexity*.

How did certain organs begin **Mivart** said that the argument he raised thus proved that God existed. His argument was the logical fallacy of an “argument from ignorance.” That is, “As we don’t know how x happens, so a god / God did it.” A scientific reaction would be, “As we don’t know how x happens, we must study further.”

Darwin answered **Mivart** with a new chapter in the next edition of *Origin of Species* arguing that some changes, such as a rudimentary wing could have arisen to perform a different function, such as regulating the organism’s temperature. The issue is a legitimate question and still live in biology.

Proponents of the *Design Argument* have similarly proposed other examples of purported irreducible complexities. Over the years, biologists have proposed answers to such arguments.

Darwin: “those primitive ancestors who were the wisest, used weapons and traps best, and who could best defend themselves, had the most children. Races evolved due to sexual selection, not Natural Selection.”

Eugenics **Darwin** understood the eugenic implications of *Natural Selection*, “With savages, the weak in body or mind are soon eliminated. We civilized men [try to keep all humans alive]. Vaccination has preserved thousands who from a weak constitution [would have died]. Thus the weak propagate their kind. . .this must be highly injurious to the race of men.” [When all, even the “unfit,” survive, it is more accurate nowadays to say “survival of those who mate the most.”] Big families good.

Dogma vs. science, Tennessee Supreme Court: Non-believers can’t be “heard or believed in a court of justice in a country designated as Christian.” (Six US states now have laws banning non-believers from holding public office. These laws are unconstitutional and ignored.)

1871 Biology: **William Thomson**: “Dead matter can’t become living matter.”(ref 1846, ‘53)

1872 Theology: **John Henry Newman**, (ref.1864), Brit, After he became a Catholic priest, “I have been unable to see the logical force of the [Design] Argument. I believe in design because I believe in God; not in a God because I see a design.” He was made a cardinal in 1879 and named a saint in 2019.

1873 Racism in America: In Colfax, La., a mob of KKK and former Confederate soldiers murdered 62-153 black militiamen who were surrendering. The Supreme Court ruled in US vs.

Supreme Court justice. **Cruikshank** (1876) that protections of the 14th Amendment did not apply to persons acting individually, but only to state governments. So, the federal government could no longer prosecute actions by paramilitary groups. Intimidation, murders, and Black voter suppression by such groups were

instrumental to the Democratic Party regaining political control of Southern legislature by the late 1870s.

1875 Sumerian epics in the British Museum Sumerian flood story published: George Smith (1840-76) Brit, Assyriologist, in 1870 was hired by the British Museum to examine the tablets from **King Sennacherib** and **Ashurbanipal's** libraries in Nineveh. **Smith** discovered among the tablets an account of a great flood. These had been discovered 1849-52 and brought to the British Museum around 1860. A more complete description of the *flood story* appears herein at 1300 BC when it was well known in the Mid-East. It subsequently became lost to history.

Smith saw clear similarities between the *flood story* in *Genesis* and the *Chaldean* flood story, so he translated and published it in 1875. He titled his work, *The Chaldean Account of Genesis*. His publication caused widespread controversy. It was years later found to be part of the epic of *Gilgamesh*.

The publication was a theological bombshell. It caused an revolution in Biblical scholarship. **Moses's** birth story and many other biblical stories were soon found to be very similar to older Mid-East myths, mainly Chaldean. Sumerian myths were likely the source of the Greek cult of Adonis and of the Christian-Jewish drama of the Messiah (There is no physical evidence of such flood).

1872 Philosophy: W W Reade (1838-75), Scot, philosopher, "God is not in accordance with the cultivated mind; it can only be accepted by suppressing doubts, and by denouncing inquiry as sinful. It is therefore a superstition."

Free-thinking Agnosticism: Leslie Stephen, ex-Anglican priest, printed *Essays on Freethinking and Plain Speaking*. He sought real spiritual fulfillment that didn't come from religion as religion was impossible to believe. He popularized the word *agnostic*.

Alfred Russel Wallace Biology, Evolution: Alfred Russel Wallace became a great champion of *Darwinism* and lectured on it in the US. He summarized Darwinism, of three principles and an inference. The principles are the high rate of multiplication prevents all offspring to survive and creates a struggle for food, significant variation occurs within a species, and variation is heritable. The inference drawn is that the most fit organisms, survive to reproduce. He did, however, consider that evolution was guided by God. He thought that this reconciled science and religion and provided for the objectivity of moral values. In the 1940s, **Billy Graham** used the same *reasoning*. But, *guided* evolution is *the opposite of Darwinism*.

1873 Physics, Electromagnetism: Maxwell (ref.1831, '55, '61, '67) summed up all electricity in his *Treatise on Electricity and Magnetism*. It described electricity and magnetism and their unity. *Electromagnetic potential* was the center of his theory. (See pp. 426-29)

1873 Capitalism: The period around 1870-1910 was a time of a weak US government when "robber barons," businessmen and financiers, amassed vast wealth through ruthless now-illegal practices.

America's Gilded Age was not a golden age **Cornelius van der Bilt**, a railroad robber baron, once wrote some business rivals, "You have undertaken to ruin me. I will not sue you, for law takes too long. I will ruin you." And he did. He said, "What do I care about the law, Hain't I got the power?" **Mark Twain** and **Charles Warner's** *The Gilded Age: A Tale of Today*, satirized the promised "golden age" after the Civil War and portrayed it as an era of serious social problems masked by a thin gold gilding of economic expansion. (See also 1889-**Carnegie** and 1911-**Morgan**).

1873 When **Agassiz** (ref. 1860) died, his creationist ideas were carried on by **Nathaniel Shaler**. He had come to accept evolution but said it needed the guidance of God. This is not Natural Selection.

Shaler led the American *neo-Lamarckian* school which held out for order, purpose and progress in nature based on inheriting features acquired during an organism's lifetime.

A voice of reason Evolution: James McCosh (1811-94), minister, philosopher, president of Princeton, saw that saying Darwinism was false was a sure way to make students atheists. He preached compromise.

1874 The Design Argument refutes an omnipotent God Design Argument: John Stuart Mill (ref.1835, '51, '59, '63, '69) in *Theism*, one of *Three Essays on Religion*, published one year after he died, said that the *Design Argument* was evidence against an omnipotent God. "What is meant by design? Contrivance, the adaption of means to an end. But the necessity for contrivance --the need of employing means -- is a consequence of limited power. "Who would have recourse to *means* if to attain his ends his mere word was sufficient?" "Wisdom and contrivance are shown in overcoming difficulties, and there is no room for them in a being for whom no difficulties exist." Also, "The time appears

to me to have come when it is the duty of all to make their dissent from religion known."

A great proportion of the brightest people are complete skeptics in religion

He said, "[T]he deist God is . . . presumed to be an intelligent, supernatural being with some sort of consciousness. [As such, he] is indistinguishable from the complete . . . nonexistence of a god in our universe, as neither of these scenarios include a deity intervening or affecting our world."

"The world would be astonished if it knew how great a proportion of its brightest men, those most distinguished even in popular estimation for wisdom and virtue, are complete skeptics in religion."

The statements of kings and rulers quoted at 1532 bear this out. **Mill** also said, "Men who place implicit faith in their own common sense are without exception the most wrong-headed."

Hell corrodes the mind

Philosophy: John Morley, Viscount of **Blackburn** (1838-1923), Liberal statesman, "You have not converted a man because you have silenced him. All religions die of one disease . . . being found out. . . . The most frightful idea that has ever corroded human nature was the idea of eternal punishment."

1876-78 Josiah Gibbs

Physics, Thermodynamics: Josiah Williard Gibbs, professor at Yale, wrote *On the Equilibrium of Heterogeneous Substances* (two volumes 1875 and 1878). It is now called the Principia of thermodynamics. He showed that thermodynamics didn't apply only to heat and energy on a large scale, but was also influential at the atomic level of chemical reactions, as **Henri Hess** in 1840 had suggested.

Equilibrium of Heterogeneous Substances

Gibbs's work on the applications of thermodynamics was instrumental in transforming physical chemistry into a rigorous inductive science. With **Maxwell** and **Ludwig Boltzmann**, he created statistical mechanics (a term that he coined), explaining the laws of thermodynamics. His work dealt mainly with the *Second Law of Thermodynamics*, "In a natural thermodynamic process, the sum of the entropies of the interacting thermodynamic systems never decreases." **Sadi Carnot** 1824) that is that thermal energy always goes from a hotter substance to a cooler one.

Gibbs

Gibbs's paper contained, as far as general principles are concerned, almost all of the science now called physical chemistry. **Gibbs** did for thermodynamics what **Newton** and **Maxwell** did for mechanics and electromagnetics. He discovered a series of natural laws governing the conditions of any matter anywhere.

Gibbs discovered the laws of change

Equilibrium implies a balanced equation. **Gibbs** sought to discover the equations that governed all chemical change, as when water becomes ice or steam, or is decomposed into hydrogen and oxygen or when hydrogen combines with nitrogen to become ammonia.

Every process in nature involves change and Gibbs discovered the laws governing such changes. The rules he discovered facilitated a great variety of industrial chemical processes.

1875 Men fear that women are equal.

Male supremacy: Susan B Anthony (1820-1906) American social reformer, suffragist, "By law and religion from **Moses** to the present, women have never been thought of as other than property, to be disposed of at the will and pleasure of man. The fear that women will prove equal to men has resulted in religions keeping women subservient, unschooled, without rights, isolated, the property of men." This subjugation halves the brain pool. **Socrates**: "Woman, once made equal to man, becomes his superior."

1875 Conflict between religion & science

Science vs. Religion: John W Draper (1811-82), born in England, professor at NYU, first president of the American Chemical Society, wrote *The History of the Conflict Between Religion and Science*. He said there was a Supreme Power, but not a Supreme Being. (He had spoken at the 1860 **Huxley -Wilberforce** encounter on *Darwinism* at Oxford.)

"The history of science. . . is a narrative of the conflict of two contending powers, the expansive force of the human intellect. . . and the compression arising from traditional faith..

Scientists don't torture for science

"[Science] presents herself unstained by cruelties. She has never attempted to throw odium or inflict social ruin on any human being. She has never subjected anyone to mental torment, physical torture, least of all death, to uphold or promote her ideas."

He ridiculed the legal processes of the early Christians for deciding guilt or innocence by such tactics as seeing whether the accuser or accused could hold his arms outstretched the longest, or by drowning, also practiced by the Puritans. His book had 50 printings. The Spanish version was put on the *Index*.

Draper discovered the spectrum of an ignited solid is continuous, a great help in studying galaxies.

1875 Ulysses S Grant, president, message to Congress: "Encourage free schools, strictly sectarian, tax all property equally, whether church or corporation. Keep the church and state forever separated."

1875 Germany: Otto von Bismark, (1815-98) Prussian, unified Germany: Politics is the art of the possible,

Kulturkampf against Catholicism

the attainable. Prussia was mostly Protestant. Bavaria was mostly Catholic. The Catholic Church in Germany was much more than a Sunday visit. The Church was deeply involved in all aspects of life, not just in Bavaria, in politics (its own political party), its education, newspapers, youth groups, social groups.

Bismark began his *Kulturkampf* / *Culture Struggle*, a policy of persecution against Catholics.

Catholic schools were taken under state control, Catholic orders were forbidden to teach, Jesuits were banished, civil marriage was begun in Prussia, bishops and clergy opposing *Kulturkampf* laws were fined, jailed, exiled. The movement spread to neighboring states, in France in a new wave of anti-clericalism.

Practicing Theology:

Theological thinking: Dr. **Arthur Stanley**, Anglican Dean of Westminster, said: "It is now clear that *Genesis* contains two narratives of the creation. . . differing from each other in almost every particular of time and place and order. It is well known that, when the science of geology first arose, it was involved in endless schemes trying to reconcile it with the Scripture. . .

Twisting the words of the Bible

There. . . are perhaps still two modes of reconciliation of Scripture and science, which have been each in their day attempted, and each has totally failed." One is to wrest the words of the *Bible* from their natural meaning and force it to speak the language of science. . . The other, efforts to twist the earlier chapters of the book of Genesis into apparent agreement with the latest results of geology - representing days not to be days, morning and evening not to be morning and evening, the Deluge not to be the Deluge, and the ark not to be the ark."

The stupid masses should be ruled by the wise few.

Philosophy: **Thomas Carlyle**, (ref 1840) What is philosophy but a continual battle against custom; an ever-renewed effort to transcend the sphere of blind custom, and so become transcendental?" He defended slavery as due to Negroes' inferiority, said West Indies development was due solely to British ingenuity. He said that the stupid masses should be ruled by the wise few. Said, "Popular opinion is the greatest lie in the world."

1876 Catholicism: **James Cardinal Gibbons**, Baltimore, "The Church is not susceptible of being reformed in her doctrines. The Church is the work of an incarnate God. Like all God's works, it is perfect. It is, therefore, incapable of reform."

c.1870- c.1910 Age of Freethought

The Golden Age of Freethought was a socio-political secular movement that grew in the US c.1870, like secularization had grown in Western Europe's intelligentsia. It had no precise beginning or ending year. It was an age when anti-religious and rational arguments reached a wide acceptance, principally through public lectures and periodicals. Freethinkers were united by their support for the absolute separation of church and state and for free public education.

Nation's foremost public orator for over 30 years

Freethought periodicals: such as the *Truth Seeker* from Peoria and then NYC, with a national audience, the *Boston Investigator*, the *Free-Thought Ideal*, the *Free-Thought Vindicator* of Ottawa, Kansas, and the *Blue Grass Blade* from Lexington, Kentucky. spread its messages.

The Age of Freethought's best known orator and writer was **Robert Green Ingersoll** (1833-99) known as "the Great Agnostic," colonel in the Civil War, attorney general of Illinois, prominent Republican, and most famous public orator in the US for 30 years.

Ingersoll expressed the beliefs of freethinkers

"There is no slavery but ignorance." "Reason, observation, and experience, the Holy Trinity of Science, have taught us that happiness is the only good." "An honest God is the noblest work of man." "He loves his country best is he who strives to make it best. Philosophy has not the egotism of faith. "Any God who would damn one of his children for saying his honest thought wouldn't make a decent thief." "There can be but little liberty on earth while men worship a tyrant in heaven."

Ingersoll Quotes

"I am the inferior of any man whose rights I trample underfoot." "Nothing discloses real character like the use of power." "There are in nature neither rewards nor punishments--only consequences." "Infinite punishment is infinite cruelty, endless injustice, immortal meanness."

If the people of Europe had known as much. . . about the sciences as is now known, the [Bible] never could have been written. It was produced by ignorance, and has been believed and defended by its author. It has lost power in the proportion that man has gained knowledge."

Ingersoll Quotes

"To establish facts, the word of man is now considered far better than the word of God. In the world of science, Jehovah was superseded by **Copernicus, Galileo, and Kepler.** . . In matters of fact, the *Bible* has ceased to be regarded as a standard. Science has succeeded in breaking the chains of theology."

"A few years ago, Science endeavored to show that it was not inconsistent with *the Bible.* . . Now, religions endeavor to show that *the Bible* is not inconsistent with Science."

What free thinkers believed c.1870-c.1910	"No one in the world's whole history, ever attempted to substantiate a truth by a miracle." "Truth scorns the assistance of miracle. Nothing but falsehood ever attested itself by signs and wonders. No miracle ever was performed. . .and until one is performed, there can be no evidence of the existence of any power superior to, and independent of nature." "Nature never prompted a loving mother to throw her child into the Ganges." "Martyrdom, as a rule, establishes the sincerity of the martyr, not the correctness of his thought."
Ingersoll Quotes	<u>"It always seemed absurd that a god would choose for his companions during all eternity the dear souls whose highest and only ambition is to obey."</u>
The Bible OK'ed slavery, polygamy, selling babies.	<u>"The believer in the inspiration of the Bible must say, that there was a time when slavery was right, when men could sell their babes, when polygamy was the highest form of virtue, when wars of extermination were waged with the sword of mercy, when religious toleration was a crime, and when death was the just penalty for having expressed an honest thought. He is compelled to insist that Jehovah is as bad now as he was then; that he is as good now as he was then."</u>
"God" once ordered actions that now are crimes	<u>"Once, all the crimes that I have mentioned were commanded by God; now they are prohibited."</u> <u>"Once, God was in favor of them all; now the Devil is their defender. In other words, the Devil entertains the same opinion to-day that God held four thousand years ago."</u> "The Devil is as good now as Jehovah was then, and God was as bad then as the Devil is now." "It may be said that it is unfair to call attention to bad passages in the Bible. To this it may be replied that <u>a divine being ought not to put bad passages in his book.</u>"
Ingersoll Quotes	"I do not believe that the tendency is to make men and women brave and glorious when you tell them that there are certain ideas upon certain subjects that they must never express; that they must go through life with a pretense as a shield; that their neighbors will think much more of them if they will only keep still; and that above all is a God who despises one who honestly expresses what he believes."
The Old Testament God advocated cruelty, and killing	<u>"My great objection to the Old Testament is the cruelty said to have been commanded by God. All these cruelties ceased with death. The vengeance of Jehovah. . .never threatened to punish the dead."</u> <u>"There is not one word, from the first mistake in Genesis to the last curse of Malachi, containing the slightest intimation that God will take his revenge in another world."</u> (i.e., Hell) <u>"It was reserved for the New Testament to make known the doctrine of eternal pain (Hell for a finite offence). I do not believe Christians are as bad as their creeds."</u> "I believe men will be nearer honest in business, in politics, grander in art - in everything that is good and grand and beautiful, if they are taught from the cradle to the coffin to tell their honest opinion. The inventor of paper—and he was not a Christian—did more than all the early fathers for mankind."
Freethought movement: Inventors are the real civilizers.	"The inventors of plows, of sickles, of cradles, of reapers; of wagons, of coaches, of locomotives; of skiffs, sail-vessels, steamships; the men who have made looms-in short, the inventors of all useful things-are the civilizers." <u>"The men who have invented the useful, and the men who have made the useful beautiful, are the real civilizers of mankind."</u> <u>"The priests, in all ages, have been hindrances, stumbling-blocks. They have prevented man from using his reason."</u>
Priests have always fought progress.	"Give any orthodox the power, and today they would punish heresy with a whip, and chain, and fire." "In the history of the world, the man who is ahead has always been called a heretic." "We are distressed because our churches are half empty. Many of them would be emptier if the Gospel were preached in them. <u>The history of intellectual progress is written in the lives of infidels."</u>
Ingersoll Quotes	<u>"The man who does not do his own thinking is a slave, and is a traitor to himself and to his fellow-men."</u> "Who can overestimate the progress of the world if all the money wasted in superstition were used to enlighten mankind." "It is incredible that only idiots are absolutely sure of salvation."
Honest opinions are heresy.	"Whoever has an opinion of his own, and honestly expresses it, will be guilty of heresy."Regarding <u>blasphemy laws</u>, "An infinite God ought to be able to defend himself, without the help of state legislatures." <u>On the Book of Job:</u> "The children of Job were murdered to settle a wager between God and the Devil." <u>"The Bible was not written by a woman. Within its leaves there is nothing but humiliation and shame for her."</u>
Clergy can't discuss any issue rationally	<u>"Most of the clergy are, or seem to be utterly incapable of discussing anything in a fair and catholic spirit. They appeal, not to facts, but to passages of Scripture. They can conceive of no goodness, of no spiritual exaltation beyond the horizon of their creed."</u> "Bigotry in all ages has

been the same. Christianity simply transferred the brutality of the Colosseum to the Inquisition.

Clarence Darrow later called **Ingersoll** “a great man. a wonderful intellect, a great soul of matchless courage, one of the great men of the earth.”

1877
**Catholics
attacked
Darwinism.**

Darwinism criticized: **Constantin James**, an eminent French physician, wrote *Darwinism or the Man-Ape*. It said *Darwinism* was a fairy tale, a work “so fantastic and so burlesque” and was a huge joke.” **Pius 9** profusely thanked **James**, gave him the apostolic blessing and made him an officer of the *Papal Order of St. Sylvester* (see **Sylvester** in the Index). **Pius 9** said, “*Darwinism* is repugnant to history, to exact science, to observed facts, even to reason itself.”

1877
**Entropy
Boltzmann**

Thermodynamics: **Clausius’s Second Law of Thermodynamics** (1850, some energy is lost in converting heat to work, entropy). **Ludwig Boltzmann** (1844-1906) Austrian, established the relationship between entropy and his statistical analysis of molecular motion in the kinetic theory of gasses. He devised a formula to measure entropy.

**Kinetic
Theory**

Like **Gibbs** (ref. 1875), **Boltzman** connected the properties’ behavior of atoms’ molecules with the large scale properties and behavior of the substances of which they were a part. **Boltzmann** was important in getting atoms and molecules recognized as real. **Boltzman** and **Josef Stefan** said that energy output of an object was directly related to its temperature. Most scientists did not accept **Boltzmann’s** kinetic theory of gasses and it was in 1908, after **Boltzmann** died, he was proven right.

**Speed
of light
1877**

Newtonian physics limited: **Albert Michelson** (1852-1931) American physicist, said light goes 186,320 mps (only .0002 high), that the absolute motion of the Earth through space isn’t measurable as there is no reference point. He showed that the speed of light (and all electromagnetic waves) was the same in all directions however measured. (as **Clerk-Maxwell** had said in 1867). This showed that **Newton’s** laws might not apply all the time everywhere.

Michelson also refuted the popular belief (held by many, including **Descartes** and **Newton**) that a substance called aether which conducted light, existed in space.

Light waves were shown to be transverse instead of longitudinal, aether theory was replaced by later theories of **Maxwell**, **Einstein** and **de Broglie**, which rejected the existence and necessity of aether to explain the various optical phenomena.

1870s
**Social
Darwinism:
Let the
incompetent
die.**

Sociology, Social Darwinism: (ref. 1850, ‘59, ‘62, ‘64, ‘71), **Herbert Spencer** who coined the phrase “Survival of the fittest” said that the state should not assist the poor in any way, “If they are not sufficiently competent to live, they die, and it is best that they should die..The whole effort of nature is to get rid of such, to clear the world of them, to make room for the better.” He erred in saying that *Nature has a purpose*. He also opposed public education. His *Social Darwinism* thus praised man’s dominance over nature and rich men’s treatment of workers.

**Business-
men used
evolution to
justify their
greed**

“Survival of the fittest” was a biological concept. It dealt solely with which offspring or species would survive and propagate the most. This did not prevent the emerging class of robber industrialists, from using the concept to mean that their success at business was due to the natural circumstance of their being the best fittest to prosper. Descent from primitive species also seriously embarrassed clergy who told people that they were created in God’s image.

**Data of
Ethics**

Spencer’s 1879 Data of Ethics: “Scientific truths of whatever order, are reached by eliminating perturbing or conflicting factors, and recognizing only fundamental factors.”

He said evolution was a hall embracing progressive development of the physical world, biological organisms, the human culture and societies.

1878

Catholicism, communism: Pope **Leo 13** (1810-1903) allowed priests to become involved in workers political movements, social Catholicism, primarily to counter the influence of atheistic communism. “To suffer and endure. That is the lot of humanity.” He was right. Most people suffered and endured.

1879
**Pope Leo:
Thinking
causes evils**

Catholicism: **Pope Leo13** decreed that **Aquinas**, *pre-Enlightenment*, pre-Renaissance, pre-Darwin, pre-Reformation, pre-Hume, to be the definitive guide of Catholic doctrine. Only **Aquinas**-school professors could be hired. He told the clergy to use **Aquinas’s** teachings as the basis of their theological positions. **Leo** made **Aquinas** the patron of all Catholic educational institutions. He said, “Catholicism cannot be reconciled with naturalism.”
“The liberty of thinking and publishing whatsoever each one likes . . . is the fountainhead and origin of many evils. God is not only true, but truth.” (more **Leo 13** 1885, 91, 93, 99)

- 1879 **Land reform and Progress** Political Theory, property: **Henry George** (1839-97) American political economist, traveled widely, had many menial jobs, saw inequality of wealth everywhere. He saw the paradox of “progress” and “poverty.” He wrote *Progress and Poverty* during a serious national depression with widespread suffering and sporadic labor strikes. No publisher would publish it. He got it privately printed.
- George quotations** It said, “So long as all the increased wealth which modern progress brings goes but to build up great fortunes, to increase luxury and make sharper the contrast twix the House of Haves and the House of Want, progress is not real and cannot be permanent. . . We must make land common property. . .”
“Great wealth always supports the party in power, no matter how corrupt.” [Actually the more corrupt the better for the rich as they are the only ones with the money to corrupt those in power.]
“Great wealth instinctively fears change . . . The ideal state is not that in which each gets an equal amount of wealth, but in which each gets in proportions to his contribution to the general stock.”
“How can a man be said to have a country when he has no right to a square inch of it?”
- Great wealth always supports the party in power, no matter how corrupt.** The book became one of the most widely economic treatises of all time. Millions of copies were sold. He advocated raising all public revenues by a single tax on land values. **George** spent his life traveling, lecturing, and promoting his ideas. He died at 58, millions mourned him.
- 1880 Political Theory, powers of the state: **Disraeli** (ref 1837, ‘64) “The greatest of all evils is a weak government. It seems to me a barren thing, this conservatism – an unhappy crossbreed, the mule of politics that engenders nothing.” “The greatest education is adversity.” “I consider it a great homage to public opinion to find every scoundrel nowadays calling himself a liberal.”
- 1880 **Thorvald Thiele** (1838-1910), Dane, was first to describe the mathematics behind *Brownian motion*.
- 1880 **The Grand Inquisitor, an evil atheist cardinal.** Catholicism: **Fyodor Dostoevski's** (1821-81) *The Brothers Karamazov*, possibly his best work, a novel of the effects of passion and depravity on a father and his sons. Included is a sub-story titled *The Grand Inquisitor*; about an evil atheist cardinal. The story relates that **Jesus** had returned to Earth and come to Seville, where the Grand Inquisitor cardinal had arrested and jailed him for threatening to subvert the Church. He told Jesus that the Church no longer needed him as the vast majority of people can not cope with the free will God gave them.
- “We [clergy] must lie eternally and never cease to lie.”** The cardinal asked **Jesus**, “Did thou forget that a tranquil mind is dearer to Man than a free choice in the knowledge of good and evil? So the Church took it away and used mystery, magic, and authority. The people will live in ignorance and die happy.”
“We tell the people that it is Your will that we rule over them. We will deceive them once more and lie to them once again- for nevermore will we allow You to come amongst us.
 In this deception we will suffer, for we must lie eternally and never cease to lie.” Orwell.
 Schopenhauer, Aldous Huxley, T S Eliot, Jack Nicholson Humankind cannot bear much reality
“History has justified the Church in the belief that the masses of mankind desire a religion rich in mystery, miracle, and myth.” Will and **Ariel Durant**)
- Problem of Suffering** **Dostoevski** also said, “It is not the brains that matter most, but that which guides it, the character, the heart, generous qualities, progressive ideas. He phrased *The Problem of Suffering* as, “The death of a child is the greatest reason to doubt the existence of God.” (Historically over 25% of babies died in their first year. Over the eons, that’s billions.)
“The secret of man’s being is not to live but to have something to live for.”
- 1881 **Dogma:** Parliament stopped atheist **Charles Bradlaugh** from *affirming* rather than *swearing* on the *Bible* to take his oath of office. He said that he could not know what anyone meant by the word “God.”
- 1881 **Everything is worth studying** Mathematical statistics: **Karl Pearson** (1857-1936) Brit, polymath, *Royal Society*, barrister, established the discipline of mathematical statistics. He published *The New Werther*, “Have you ever attempted to conceive all there is in the world worth knowing - that not one subject is unworthy of study . . . literature.. many-dimensional space . . . The Kantian theory of the universe, embryology. . . Mankind seems on the verge of a new and glorious discovery. What **Newton** did to simplify the planetary motions must now be done to unite in one whole the various theories of mathematical physics.” (more **Pearson** 1892)
- Physics, thermodynamics: **Charles Parsons** (1854-1931), Brit engineer, developed the steam turbine.
- 1882 **Capitalism:** **William H Vanderbilt**, (1821-1885) American railroad heir (son of **Cornelius**, 1873), “When I want to buy up any politicians, I always find the anti-monopolists the most purchasable. They don’t come so high.” His motto, “The public be damned.”

Medicine: **Robert Koch**, *The Etiology of Tuberculosis*. Specific bacteria cause a specific disease.

1882 **Cells divide, mitosis** **Biology: Walther Flemming** (1843-1905) German, wrote *Cell Substance, Nucleus, and Cell Division*, said that cells divide in stages, named it *mitosis*. Every cell is a chemical factory that processes its own nutrients, generates energy from those nutrients, communicates with neighboring cells, and can divide into two identical cells. The cell's ability to replicate itself is the key to all life and growth. Reproduction and growth occur through cell division.

What is a Nation? Political Theory, nationalism: **Renan** (ref. 1863) in *What is a Nation?* defined a nation as when a people desire to live together, "having done great things together and wishing to do more. The existence of a nation is based on a daily plebiscite." In 1883, he said Muslims weren't capable of doing philosophy and science. He believed in a hierarchy of races.

A liberal Muslim. Religion will defeat philosophy **Muslim Reform: Sayyid Jamal al-Din al-Afghani** (1838-1897) an eminent Muslim and supporter of the *Tanzimat* (ref. 1839), considered to be a founder of Islamic modernism, agreed that all religions are intolerant and suppress the "free investigation" of science and philosophy, plus that the Enlightenment had freed Europeans from Christianity and had greatly advanced science, but that Islam would in time also advance.

The masses dislike reason because they're dumb **Afghani** said, "So long as humanity exists, the struggle will not cease between dogma and free investigation, between religion and philosophy: a desperate struggle in which I fear, the triumph will not be free thought, because the masses dislike reason. . . and as science does not completely satisfy humanity." Said that Europe's success was due to science and its laws.

Science will rule the world There is no end or limit to science. There was, is, and will be no ruler in the world but science." He criticized the religious scholars who read the old texts but did not understand electricity or a steam engine. "How can these people call themselves sages?" "An imam is like an ox yoked to a dogma that stifles science." Turkey became the most advanced Muslim country economically and socially, but still lagged far behind European countries. (more 1886)

Nietzsche: God is dead Also Sprach Zarathustra. Philosophy: **Friedrich Nietzsche** (1844-1900), German, brilliant, professor of classics at Basel at 24, in *Also Sprach Zarathustra / Thus Said Zarathustra* wrote, "Thanks to **Darwin**, God (i.e. divine explanations) is dead." (**Max Stirner** had said it in 1845).

Humans are basically motivated by the will to power. For **Nietzsche**, Christianity was decadent, a slave mentality, herd morality; it perpetuates intolerance and conformity. All human life is basically motivated by the will to power (fearlessness), the desire for a richer and stronger life.
- "He who would truly live must overcome the beliefs and conventions of common men; he must become ein Übermensch (a superman). True virtue should remain with the aristocratic minority. It is necessary for higher men to make war on the masses. Religion turns one away from life and truth."

Nihilism *Nihilism*, championed by **Nietzsche**, rejected claims to knowledge and truth, and explored the meaning of an existence without knowable truth. Morals are valueless and only hold a place in society as false ideals. **Nietzsche** said, "Everything in [the Bible] is cowardice and self-deception."

1882 Christianity is "the one immortal blemish of mankind. . . The Christian resolution to make the world ugly and bad has made the world ugly and bad. Christianity has waged a deadly war against the higher type of Man. Compassion was a weakness to be fought." **Nietzsche**, an atheist, favored religions as they assisted his favored *Übermenschen / Superman* to control the ignorant masses.

To grasp the limits of reason, only this is truly philosophy. Happiness is a pig's philosophy. "Philosophers are not honest enough in their work, although they make a lot of virtuous noise when the problem of truthfulness is touched even remotely. They all pose as if they had discovered and reached their real opinions through the self-development of a cold, pure, divinely unconcerned dialectic while at bottom it is an assumption, a hunch, indeed a kind of "inspiration" -most often a desire of the heart that has been filtered--made abstract- that they defend with reasons they have sought after the fact.
To grasp the limits of reason--only this is truly philosophy." "Happiness is a pig's philosophy."

Nietzsche "What does a philosopher demand of himself, first and last? To overcome his time in himself, to become timeless." "Science rushes headlong, without selectivity, without "taste," at whatever is knowable, in the blind desire to know all at any cost. Philosophical thinking, on the other hand, is ever on the scent of those things which are most worth knowing, the great & the important insights." Anti-Semitism is the final consequence of Judaism." "The greatest ideas are the greatest events."
"The Christian, that *ultima ratio* of lying, is the Jew all over again - He is threefold the Jew."

1888. "What is good? - Whatever augments the feeling of power, power itself, in man." 1888
Is Man only a blunder of God, or is God a blunder of Man?" **"Plato is a bore."** "The true man wants two things: danger and play. For that reason he wants woman, as the most dangerous plaything

**Nietzsche
disdained
women**

He held women in contempt. In *Also Sprach Zarathustra*, he said that women were not capable of friendship, they were still cats, or birds, or at best cows. "Man shall be trained for war and woman for the recreation of the warrior. All else is folly. Thou goest to woman? Do not forget thy whip. . . We should think of women as property, as Orientals do. Woman was God's second mistake." "Reason is only a tool." He ridiculed the social contract theory of the state. Said, "He who commands, he who is by nature, he who comes on the scene forceful in deed and gesture—what does that have to do with contracts? **Nietzsche's** philosophy became existentialism.

**Nietzsche
Quotes**

**Sin, soul,
Hell, Heaven,
saint, spirit,
grace,
salvation,
miracles,
forgiving sin,
blessing,
god, are all
imaginary
concepts.**

Said, "In Christianity, neither morality nor religion is in contact with any point of reality. Nothing but *imaginary* concepts ("God," "soul," "spirit," "*free will*," or even "*unfree will*"), nothing but *imaginary* concepts ("sin," "salvation," "grace," "punishment," "forgiveness of sin"). An intercourse between *imaginary* beings ("Gods, spirits, souls"). An *imaginary science* of nature (anthropocentric; no concept of natural causes.). An *imaginary* psychology, (nothing but self-misunderstandings),. . . repentance, remorse of conscience," "temptation by the devil." [It is all] a purely *fictitious* world. "All the affairs of life are regulated so that a priest is needed at all events of natural life, at birth, at marriage, at sickness, death, not to speak of the sacrifice, (the meal) the holy parasite appears to denaturalize them: in his language, to "sanctify" them?"

**Christianity
says doubt
is a sin.
(Doubt is
thinking)**

"Christianity has done its utmost to close the circle and declared even doubt to be sin. "One is supposed to be cast into belief without reason, by a miracle, and from then on to swim in it as in the brightest and least ambiguous of elements: even a glance towards and, even the thought that one perhaps exists for something else as well as swimming, even the slightest impulse of our amphibious nature is sin! And notice that all this means that the foundation of belief and all reflection on its origin is likewise excluded as sinful."

"What is wanted are blindness and intoxication and an eternal song over the waves in which reason has drowned." All religions bear traces of the fact that they arose during the intellectual immaturity of the human race - before it had learned the obligation to speak the truth. Not one of them makes it the duty of its God to be truthful."

**1883
He denied
a deity**

Philosophy: Thomas Alva Edison (1847-1931) American, prolific inventor of electrical devices, denied a God directing our mundane affairs, punishing or rewarding us, existed. When the churches learn to take this rational view of things. When they become true schools of ethics and stop teaching fables, they will be more effective. Also, "There is nothing that a man will not do to avoid the real labor of thinking."

Race Killing

Racism in America: From 1883-1941, White mobs lynched over 3,200 Blacks.

**Destructive
eruption**

Physics, geology: Krakatoa in Indonesia erupted six cubic miles of rock. Ashes and smoke rose 50 miles, caused red sunsets worldwide for 50 years and worldwide crop shortfalls.

1884 Medicine, vaccines: Pasteur (ref 1856-7, '60, '62, 67). His greatest triumph was to develop a vaccine for rabies, previously 100% fatal to victims. Said, "Chance favors the prepared mind."

Catholicism

Pope **Leo 13** attacked Freemasonry, calling Masonic anti-clericalism in cults like it, "one can clearly see the spirit of arrogant obstinacy, of uncontrollable perfidy and simulation of the Devil."

Political Theory: Spencer (ref.1862) *The Man Versus the State*. Powerful argument for libertarianism.

1885 Education: Leland Stanford, a railroad robber baron, founded **Stanford U.** to be the "Harvard of the West" It was to prohibit sectarian instruction, teach the soul's immortality, that a wise benevolent creator existed.

**1885
internal
combustion
engine**

Technology: Nicolas Otto (1832-91), German, invented the four stroke internal combustion engine. **Gottlieb Daimler** (1834-1900), German, built an internal combustion engine and a motorcycle. **Karl Benz** (1844-1929) German, built the first practical auto with an internal combustion engine. **Ottmar Morgenthaler** revolutionized printing with a linotype machine. It cast whole lines of type at once.

1886 Psychology: Baron Richard Kraft-Ebing (1840-1902), German psychiatrist, "The sexual instinct, when disappointed and unappeased, frequently finds a substitute in religion."

- 1886 **Fear is the mother of morality** **The superman is more important than ideas sanctioned by logicians** Philosophy, **Nietzsche**: *Jenseits von Gut und Bose /Beyond Good and Evil*, the philosophy of the Superman. He who would transcend man in his will to power making his own laws. Ideas that preserve life and add to a man's power are more important than ideas sanctioned by logicians and seekers after the absolute. And, men must go beyond conventional morality in order to live creatively.
He said that fear is the mother of morality, and the established values of society were invented by the weak to enable them to triumph over the strong. (In contrast, **Machiavelli** (and others) said that the rules of society were to enable the strong to keep the weak in submission.) **Nietzsche**, a professor for just ten years, sickly, retired due to ill health, went insane in 1890 at 44, died at 56.
Charles Van Doren asserts that **Nietzsche** was driven to his madness by the bland dishonest complacency of his contemporaries who ignored him but honored writers who were comic book figures.
- 1886 **Theory of knowledge** Physics: **Ernst Mach** (1838-1916), Austrian, "Sensations are not simply raw experiences, but the interaction of experience with a pre-formed cognitive structure." (**Kant's** concept).
The mind cannot come up with new ideas. But scientists can select from a pool of randomly generated ideas which theories best fit the available data and other pre-existing ideas.
Syllogism and induction do not create new knowledge, but merely make sure there's no contradiction between our insights and shows how these are connected.
- Newtonian physics needs an absolute time and space reference point.** Physics: **Mach** stated correctly that **Newton's** laws of mechanics needed to be referenced to certain specific times and places / "inertial frames of reference. A planet has one velocity relative to the Sun but another relative to the center of its galaxy. Distance determines the inertial frames related to gravity. **Mach** thus rejected **Newton's** absolute frame of reference for space-time. Accelerated motion's reference point is the average mass distribution in the universe.
Einstein credited **Mach** in his writings on relativity. These frames are those relative to which the distant matter of the universe is on average, not accelerating. He suggested that distant matter determines the inertial frames related to gravity.
- Refutation of the Materialists** Islam: **al-Afghani** (ref.1882) published *The Refutation of the Materialists*, to refute **Sayyid Ahmad Khan**, who had argued that science is more important than religion in the rise of civilizations. He sought to reconcile Islam with Western progress. *Refutation* criticized naturalists/ materialists for denying that there is a higher intelligence operating in the universe.
- Afghani** *Refutation* was a scientific and philosophical criticism of **Darwin** and his evolutionary theory. **Al-Afghani** rejected chance in nature and accused the materialists of attributing "perception and intelligence" to atoms (i.e., matter) in and of themselves. The most philosophical section of the treatise rejected the idea of universe as a self-regulating structure without a higher intelligence operating on it.
- 1886 America welcomed immigrants: "Give me your tired, your poor, your huddled masses yearning to breath free. Send these, the tempest tossed to me." **Emma Lazarus's** poem on the Statue of Liberty. America, along with many countries, has gotten far more selective regarding immigrants.
- 1886 Political Theory, communism: Communists in London called a strike for an eight hour day against Christian employers who worked children seven days a week.
- 1886 Evolution: Two more *Neanderthal* (ref. 370K BC, 1856) skeletons were found near Spy, Belgium with stone tools and the remains of extinct animals. Scientists began to realize Modern humans had primitive ancestors. *Neanderthals* stood upright, used fire, lived in caves, survived harsh winters.
- 1887 **A humane capitalist** Capitalism: **Ernst Werner Siemens** (ref 1855, '67) founder of **Siemens** GmbH, advocated social democracy. He hoped that industrial development would not be used to help capitalism.
Said, "A number of great factories in the hands of rich capitalists, in which "slaves of work" drag out their miserable existence, is not, therefore, the goal of the development of the age of natural science, but a return to individual labor, or where the nature of things demands it, the carrying on of common workshops by unions of workmen, who will receive a sound basis only through the general extension of knowledge and civilization, and through the possibility of obtaining cheaper capital."
Will Durant, "Capitalism abounds with price manipulation, business chicanery, irresponsible wealth."
- 1887 **Power corrupts** Religion: Lord **Acton** (ref.1862, '70) wrote regarding the pope's 1870 claim of infallibility, "Power tends to corrupt, and absolute power corrupts absolutely. . . Great men are almost always bad men." "There is no worse heresy than that the office sanctifies the holder of it."
- The Papacy** "To break with the Church because the Papacy had shown itself wicked in 1870 is ridiculous."

had been wicked for centuries The papacy had been wicked for centuries. . . It had “contrived murder and massacred on the largest and also on the most cruel and inhuman scale. What was the [infallibility] decree compared to the *Inquisition* and the *St. Bartholomew Day Massacre*?”

Lord Acton Quotes “Liberty is not a means to a higher end. It is itself the highest end.” “When a rich man becomes poor it is a misfortune, not a moral evil. When a poor man becomes destitute, it is a moral evil, injurious to society and morality.” The most certain test to judge whether a country is really free is the amount of security enjoyed by minorities.

The Study of Geography 1887 **Anthropology: Franz Boas** (1858-1942) German American, the “father of modern anthropology.” His book *The Study of Geography* distinguished between physical sciences, like physics, which seeks to discover laws governing phenomena, and historical science, which seeks a thorough understanding of phenomena on their own terms. Geography must be historical in this sense. He disagreed that evolutionary changes had a purpose. Said changes were by **Darwin’s** natural selection

1887 **Boas** studied how disparate beliefs and convictions melded into something called culture. He promoted “culture” as an organizing principle of history. Every group of people distinguished by language or adaptive inclination was a unique facet of the human legacy. He studied how members of distinct societies came to interpret the world. This became the central revelation of modern anthropology. (More **Boas** 1906, ‘29, pp. 462, ‘90. Related 1890-**Mahan** and 1904-Geography)

1888 **Political Theory, communism: Grover Cleveland** (1837-1908), US president, “Communism is hateful and a menace to peace and organized government; but the communism of combined wealth and capitalism, due to overweening cupidity and selfishness, which insidiously undermines the justice and integrity of free institutions, is not less dangerous than the communism of oppressed poverty and toil.”

1888 **Psychology: Moritz Guedemann** (1835-1918), rabbi, Men will sooner give up their rights than their customs.

1889 **Biology, Heredity: Hugo de Vries** (1849-1935), Dutch, botanist and geneticist. published *Intracellular Pangenesis*, in which, based on a modified version of **Darwin’s** theory of Pangenesis (1868), he said that different characteristics have different hereditary carriers. He specifically posited that inheritance of specific traits in organisms comes in particles he called pangenesis, later called genes.

1889 **Racial Bigotry:** The US Supreme Court disgracefully upheld the 1882 and 1884 *Chinese Exclusion Acts*, (Chinese laborers can’t immigrate)(Chinese legal resident of California can’t return to the US).

Survival of the fittest business-man is essential for society. Conservatives seek to morally justify selfishness **Social Darwinism: Andrew Carnegie** (1835-1919), Scottish American, wrote *The Gospel of Wealth*, “While the law [of competition] may be sometimes hard for the individual, it is best for the race, because it insures the survival of the fittest in every department.
- We accept and welcome, therefore, as conditions to which we must accommodate ourselves, great inequality of environment, the concentration of business, industrial and commercial, in the hands of the few, and the law of competition between these, as being not only beneficial, but essential for the future progress of the race.”
John Kenneth Galbraith (1908-2006), Canadian-American philosopher, explained, “The modern conservative is engaged in one of man’s oldest exercises in moral philosophy, finding a superior moral justification for selfishness.”

Sea Power modern navies 1890 **Political Theory, sea power: Admiral Alfred T Mahan** (1840-1914) published *The Influence of Sea Power upon History, 1660-1783*, based on his lectures at the War College in Newport, Rhode Island. It played a dominant part in shaping the modern navies of the world. Translations were made quickly into German, Japanese, French, Italian, Russian, and Spanish.

1890 **Anthropology: Sir James Frazer’s** *The Golden Bough* was a compendium of the hundreds of weird, bizarre, magical, supernatural, strange, savage, curious, outlandish myths, superstitions, and taboos told by priests of primitive societies. Christians criticized the book as it included **Jesus’s** resurrection. Later editions grew to 12 massive volumes. It has greatly influenced both literature and anthropology.

The validity of an idea depends on its impact. **Philosophy, pragmatism: Charles Peirce** (1839-1914), polymath, philosopher, and mathematician, founded pragmatism, America’s first indigenous school of thought, where the validity of an idea lay solely with its consequences. He said, “If the hypothesis of God works satisfactorily in the widest sense of the word, it is true.” The difference between utilitarianism and a pragmatist is subtle. A pragmatist does what works best in an individual

situation; a utilitarian does what will bring the most happiness to the most people.

Actions can be statements	He said, "In the matter of ideas, the public prefers cheap and nasty." Peirce also founded <i>semiotics</i> , a branch of structuralism whose <u>basic idea is that all sorts of behavior communicate</u> . Like language, they make a statement, like a nose ring, <u>tattoos, style of clothing</u> . (Words can be actions, 1962- J L Austin)
William James Quotes	William James (1842-1910), philosopher, continued Peirce's thinking. " Newton's gravity is true as it has proven useful in predicting the behavior of objects. All our scientific and philosophic ideals are altars to unknown gods. <u>An act has no ethical quality whatever unless it be chosen out of several all equally possible</u> . Be not afraid of life. <u>Believe that life is worth living, and your belief will help create that fact.</u> "
Humans want to be appreciated	Psychology " <u>The deepest principle in human nature is the craving to be appreciated</u> . Religion is a monumental chapter in the history of human egotism." ("God loves you" is powerful.) "Reasoning is only one of a thousand possibilities in the thinking of each of us." "Philosophy is the eternal search for truth, a search which inevitably fails and yet is never defeated; which continually eludes us, but always guides us." "A philosophy is an expression of a man's character."
Philosophers contradict other philosophers	Philosophy: James said, " <u>There is only one thing a philosopher can be relied on to do, and that is to contradict other philosophers.</u> " "The books of natural theology which satisfied the intellects of our grandfathers seem to us quite grotesque, representing, as they did, a God who conformed the largest things of nature to the paltriest of our private wants." " <u>The God whom science recognizes must be a God of universal laws exclusively, a God who does a wholesale, not a retail business</u> . He cannot accommodate his processes to the convenience of individuals." "Religion, in short, is a monumental chapter in the history of human egotism." (1902)
The rich are honest; the poor are sinners.	Christian theology: Russell H Conwell (1843-1925), Baptist minister, lawyer, and educator, extolled the rich and said God punished the poor for their sins. In a speech entitled <i>Acres of Diamonds</i> given over 6,000 times, he said, "The men who get rich may be the most honest men. . . in the community. . . 98% of the rich men of America are honest. That is why they are rich. . . the number of poor. . . to be sympathized with is very small. To sympathize with a man whom God has punished for his sins . . . is to do wrong. . . There is not a poor person in the U S who was not made poor by his own shortcomings."
1890	Mormonism : A divine revelation told the Latter Day Saints president that polygamy was not OK, so it was ditched. LDS is the largest Mormon sect. Mormons baptize dead people of other religions.
1891 Rerum Novarum	Catholicism : Leo 13's (1878) bull, <i>Rerum Novarum</i> , an answer to Karl Marx , critiqued the social decay caused by industrialization and criticized <u>greedy employers who "grind men down with excessive labor as to stupefy their minds and wear out their bodies."</u> <i>Rerum Novarum</i> outlined the rights of workers to a fair wage, safe working conditions, and the formation of labor unions, while affirming the rights of property and free enterprise, against both socialism and <i>laissez-faire</i> capitalism. Leo believed the answer to socialism was a Christian intellectual renaissance based on faith and reason. The renaissance was to be based on the thoughts of Thomas Aquinas . (127) As late as 1912, in textile mills, wages averaged \$8.76/week. 36% of workers died by 25.
Rights of workers	
	Political Theory, socialism : Daniel DeLeon (1852-1914), American Marxist/socialist, "The Catholic church. . . upheld feudalism, then monarchism, warning of growing evils and revolutions. In the same manner and under the same reservations, she now upholds capitalism; <u>but above all things and forever, she upholds the Catholic Church.</u> "
Difference between socialism & communism	Political Theory : <u>The difference between socialism and communism</u> : <u>Under communism</u> , most property and economic resources are owned and controlled by the state (rather than individual citizens). Religion is effectively abolished. <u>Under socialism</u> , all citizens share equally in economic resources as allocated by a democratically-elected government. classes exist but differences are diminished. It is possible for some people to earn more than others. Religions are undisturbed.
1892	Medicine : Dr. William Coley (1862-1936), American, founded <i>immunotherapy</i> , <u>inducing one's immune system to fight cancerous tumors</u> , by injecting a fever-inducing bacteria into the tumor.
The Grammar of Science	Physics : Karl Pearson's (ref.1880) <i>The Grammar of Science</i> : "The laws of nature are relative to the perceived ability of the observer. <u>An observer who travels at the velocity of light would see an eternal now, or an absence of motion.</u> " "[If he is looking backward.] He also discussed anti-matter, the 4 th dimension, and wrinkles in time.

A believer in the equality of the sexes, he was an eugenicist, a social Darwinist, a freethinker, and, as a socialist, refused the OBE in 1920 and a knighthood in 1935.

1890s
The study of religions as a socio-cultural phenomenon from primitive polytheism to monotheism

Religion: German Protestant theologians at the U. of Göttingen founded *The History of Religions School* to study religion as a socio-cultural phenomenon from primitive polytheism to monotheism. The pope condemned it, see 1893. Various sciences were involved:

Sociology (religion is primarily a system of social cohesion. And **Emile Durkheim**, a unified system of beliefs and practices relative to sacred things, and **Peter Berger** a human enterprise by which a sacred

cosmos is established, the audacious attempt to make the universe as being humanly significant).

- **Anthropology** (human behavior, religious ritual and practice and the creation of cultural norms),

- **Psychology** (**Freud**, certain dogmas, assertions about facts, and conditions of reality which tell one something one has not discovered himself)

Modern science (**Daniel Dennett**: a social system of believers in a supernatural entity whose approval is to be sought) **Kings**, religion as a system of social control, see 1532)

1892
Blake Quotes

Philosophy: **William Blake** (1757-1827) Brit, poet. "The concept of sin is a trap to bind men's desires. The history of religions is choosing forms of worship from poetic tales. **Jesus** is the only God and so am I and so are you. Men forget that all deities reside in the human heart. . .Imagination is the most important element of human existence. "Prisons are built with stones of law; brothels with bricks of religion." "A truth that's told with bad intent, Beats all the lies you can invent."

1892
Thomson is named a Baron

William Thomson (ref 1843, '46, '48, '51, '53, '67, p9. 426, 429), accomplished in many scientific areas, had been knighted in 1866. In 1892 he was made Baron **Kelvin of Largs** as the first scientist to enter the House of Lords. The temperature scale he devised from absolute zero is now called **Kelvin** scale (with the same values as *Celsius / Centigrade* degrees). Absolute zero is **Kelvin** zero. In 1884, he had erred saying that aether was 'the only substance we are confident of in dynamics." In 1900, said there was nothing new in physics to be discovered; physicists just needed better measurements.

Spiritualism: Talking to the dead, became popular. **Harry Houdini**, a famous magician, totally debunked it.

1893 **Wilhelm Wien** (1864-1928) German. An object's temperature is shown by the color it emits most intensely.

Agnosticism is a method, not a creed. One must have a reason to believe.

Philosophy: **Thomas Huxley** (ref. 1847, '60, '63, '69), in *Science and Christian Tradition*, "Agnosticism in fact, is not a creed, but a method, the essence of which lies in the rigorous application of a single principle--everyone should be able to give a reason for their faith. It is the great principle of **Descartes**; it is the fundamental axiom of modern science." "The Church lets people believe that they are good Christians and yet profit from arms factories." "The birth of science was the death of superstition."

Evolution and Ethics

Huxley disdained Protestants, "From **Wycliffe** to [other Protestant reformers], I fail to find a trace of any desire to set reason free. The most I see is a proposal to change masters from the papacy to the Bible." His *Evolution and Ethics* pitted his humanist morality against the evolutionary struggle for existence. He argued that there was a conflict between ethical progress, requiring cooperation, and "cosmic process" / the physical survival of the fittest, which was selfish.

Free land developed America

History: **Frederick Jackson Turner** (1861-1932) wrote *The Significance of the Frontier in American History*. When the settlers began to go West, they were Europeans. When they settled, they were Americans. They transformed the wilderness and it transformed them. Free land developed America.

1893 **Political Theory, socialism, Catholicism:** **August Bebel** (1840-1913), German socialist.

"Christianity is the enemy of liberty and of civilization. It has kept mankind in chains."

"Anti-Semitism is the Socialism of fools. . . The nature of business is swindling. When socialism comes to power, the Roman Church will advocate it as vigorously as it now advocates feudalism and slavery." (1906). "In time of war the loudest patriots are the greatest profiteers." (1870)

When could Women vote?

New Zealand 1893, Australia 1902, Finland 1906, Norway 1913, Denmark & Iceland 1915, Canada and Russia 1917, Poland, Germany, and England 1918, Holland 1919, USA 1920, Sweden 1921.

1893
Studying Scripture

Catholic fear of knowledge: Pope **Leo 13** (ref. 1878, '85, '91) condemned biblical scholarship based on rationalism in his encyclical letter *Providentissimus Deus / On the Study of Holy Scripture*. He said no interpreter of scriptures may interpret a text to contradict Catholic Church doctrine.

Arthur Balfour, *Foundations of Belief*; Arguments for God are not conclusive, faith is needed to believe.

Patriotism: **Oliver Wendell Holmes** (1841-1935), Supreme Court Justice, “. . . the faith is true and adorable which leads a soldier to throw away his life in obedience to a blindly accepted duty, in a cause he little understands, in a plan of campaign of which he has no notion, under tactics of which he does not see the use.” Also, “It is revolting to have no better reason for a rule of law than that it was laid down in the time of **Henry 4.**” (1897) (More **Holmes** 1919, ‘29)

1895 Anthropology” **Gustave le Bon** (1841-1913) French polymath published *The Crowd, A Study of the Popular Mind*. Said that crowds are not the sum of the individuals, that within crowds a new psychological entity forms and the “racial unconscious” of the crowd determines its characteristics .

1895 Physics: **Wilhelm Roentgen** (1845-1923) German physics prof, discovered X-rays in cathode ray tubes.

1895 Physics, Gravity: **Hendrik Anton Lorentz** (1853-1928) Dutch, said gravity could be attributed to actions that go at electromagnetic wave / light speed. He developed equations for the compression of time and space in electromagnetism and studied the theory of light and the electron theory of matter. **Einstein** used and credited his theories. (More **Lorentz**, 1905-6, pp. 429-30)

1896 **God wrote every word in the Bible. Private property is sacred.** Catholicism: **Leo 13** (ref 1878-9, ‘85, ‘91, ‘93) issued an *Encyclical*, “It is absolutely wrong and forbidden. . .to admit that the sacred writer has erred.” All the books that the Church receives as sacred and canonical (including the *Old and New Testaments*), “are written wholly and entirely, with all their parts, at the dictation of the Holy Ghost they have God for their author.” (2 *Tim*.3:16). So they were incapable of error. He said, “Private property must be held sacred and inviolable.” He and **Pius 9** ruled for 57 years (1846-1903). They tried to return the world to medieval times.

1896 **Warfare of Science with Theology** **Andrew Dickson White** (1832-1918), first president of Cornell, Christian, ambassador to Germany and Russia, pres. of the Am. History Assn, early accepted *Darwinism*. His *History of the Warfare of Science within Christendom* described many times in every field of study where Christian clergy, using, *inter alia*, torture and murder, impeded and sought to discredit all scientific ideas inconsistent with Christian scriptures, which many scientific ideas surely were. He said, “The cardinal doctrine of a fanatic’s creed is that his enemies are the enemies of God.” He also described innumerable nonsensical and irrelevant beliefs about animals promoted by Christian clergy.

Religion is fine but Christian dogma smothered science **White** described the three phases of the normal religious attack on new scientific ideas. First, saying it was contrary to scripture. Next, saying it was contrary to some great doctrine of theology. Then, when the scientific idea was validated, claiming that it was foretold by Scripture. He distinguished between religion, which he said “recognized a higher power in the universe, not ourselves, which makes for righteousness,” which fostered science, and [Christian] dogmatic theology, which made statements about the world and which accepted the *Bible* as scientific fact, which smothered science.”

Cross fertilization of Mid-East religions The source of religious myths: **White** recounted the history of the concept of creation found in Assyrian tablets, the Chaldeo-Babylon idea of the universe evolving out of the primeval flood and animals coming out of the earth and sea. **White** said this idea passed through the Phoenicians into the sacred books of the neighbors and pupils of the Chaldeans, namely the Hebrews where it was overwhelmed by the more appealing Hebrew and then Christian idea of a monotheistic God creating the universe in six days and in an instant.

The Chaldeo-Babylonian idea of the universe evolution out of a primeval flood became popular among the Greeks, who got the idea through the Phoenicians, particularly **Anaximander** (ref 504 BC), **Anaximenes**, and **Aristotle** and then to Romans, with **Lucretius** describing **Epicurus’s** philosophy, who disdained the pagan gods.

White, Some infidels were noble people **White**, “Those whom the Christian churches denounce as “infidels” includes almost all the great men of science, inventors, philanthropists, persons of noble Christian character.”(see p. 416-authors on *the Index*) **Mencken** praised the book. By 1896, most universities in the US and Europe were run by laymen, not clergy. Since **Newton**, clergy have fought a losing battle against the juggernaut of science.

As we’ve seen, **Luther** believed in the literal words of the *Bible*, (which he translated into German) so he accepted its contradictory double story of creation, and not in the scientific evolution idea. **Calvin** believed similarly including that all animals were created in six days. Some thinkers asked why God created tigers or snakes. The monk **Bede** in answered

that before the fall, animals were harmless and not poisonous..

The Bible is true as its authors strove for higher moral beliefs **White** said that Christian holy scriptures were “true,” not for their factual accuracy but because their mortal authors strove for higher moral beliefs and aspirations. But Christian clergy felt that to admit any error at all would discredit Christianity (and them). They rebuffed him. **White** said that the Chaldean flood story, where the flood was a capricious act of the god *Bel*, while the *Genesis* version, where the flood story was based on morality, showed the upward growth of Man. He died in 1899.

1896 **Racism wins in the SC. But Harlan ridiculed Plessy vs. Ferguson** **Law:** US Supreme court endorsed racism, again: *Plessy vs. Ferguson* said for races, separate but equal coaches on trains is OK. **John Marshall Harlan** (1833-1911), Supreme Court Justice, dissented: “Our constitution is color- blind, and neither knows nor tolerates classes among citizens.” “If a state can prescribe, as a rule of civil conduct, that whites and blacks shall not travel as passengers in the same railroad coach, why may it not so regulate the use of the streets of its cities and towns as to compel whites to keep on one side of the street and black citizens to keep on the other.”

Elizabeth Stanton: All religions degrade women. **Women’s rights:** **Elizabeth Cady Stanton**, with a privileged childhood, “The *Bible* and Church have been the greatest stumbling blocks in the way of women’s emancipation. The whole tone of Church in regard to women is, to the last degree, contemptuous and degrading. I know of no other books [than the *Pentateuch*] that so fully teach the subjection and degradation of women. Over the world, every religion that has breathed on this earth has degraded women, made her subject to man.”

Europeans want to degrade low caste Indians **Political Theory:** **Mahatma Gandhi** (1869-1948), liberator of India, “Ours is one continual struggle against a degradation sought to be inflicted upon us by the Europeans, who desire to degrade us to the level of the raw *Kaffir* (a low-class lazy good-for-nothing) whose occupation is hunting, and whose sole ambition is to collect a certain number of cattle to buy a wife and, then pass his life in indolence and nakedness.” (More 1899, 1907, ‘31, 1946-7)

1896 **Becquerel X-rays** **Physics:** **Antoine Henri Becquerel** (1852-1908) French, son of **Alexandre Becquerel** (ref. p. 386), while investigating phosphorescence (materials that glow in the dark after being exposed to light), saw rays emanating from uranium that resembled X-rays in their penetrating power. It was different from the three then known forces, gravity, electromagnetism, and the nuclear, “strong” force. The rays were thus called **Becquerel** rays. Scientists reported burns and hair loss from the new rays.

1897-98 **Marie Curie** **Physics:** **Marie Curie** (1867-1934), Polish, in Paris, newly certified to teach school to girls, but who sought an advanced degree chose to investigate **Becquerel’s** rays. They were at first thought to violate the *Law of Conservation of Energy*. They caused the air around uranium to conduct electricity. **Marie** theorized that the alpha rays had a feeble electric current and were coming from the atoms of uranium themselves and not from some interaction between atoms. **Marie** named the new rays *radiation*. Like **J J Thomson’s** discovery of electrons (just below), it was an important step in discovering that atoms were not indivisible, as then thought.

1897 **The first to discover particles inside atoms: electrons** **Physics:** Sir **Joseph John Thomson** (ref 1894), discovered that one type of emanation from Roentgen’s 1895 cathode ray tube conducted electricity. He deduced they are charged particles smaller in size than atoms with a negative charge. No particles smaller than an atom had yet been discovered. (**Emil Wiechert** (1861-1928), German, U. of Gottingen, said the same that year) This was the first recognition of particles within atoms, sub-atomic particles. It started the electrical theory of the atom. It founded modern atomic physics. **Thomson** also discovered that materials through which X-rays pass are rendered conducting.

Electrical theory of atoms. Positive particles must exist. Call them protons. **J J Thomson** informed the *Royal Society* that there were particles within atoms. Their trajectory was affected by nearby electric fields or magnets. **Thomson** didn’t speculate on atoms’s inner structure. Physicists then agreed that atoms must be made up of smaller particles one of which conducted electricity and reasoned that if some particles in an atom had a negative charge other particles in an atom must have a positive charge. Such unknown positively charged particles were named protons. (See 1911-**Rutherford**, 1917-protons, 1932-neutrons, and Atom-in the Index). **Thomson** correctly deduced that ultra-violet light ejected negatively charged electrons from a metal surface, leaving an excess of positive charge.

Atomism is basic **Richard Feynman:** If all scientific knowledge were destroyed and there were just one sentence that he could to pass on to the next generation, it would be that all things are made of tiny particles called atoms that move around in perpetual motion, attracting

one another when they are close but repelling each other when forced together.

1898
Tolstoy:
The Catholic
Church and
Christianity
have nothing
in common

Organized religions vs. religious thought: **Leo Tolstoy** (ref. 1532, 1865) scornfully refuted the “great man” theory of history. Said, “History is a blind force that ignores the designs of man.”

And, “The Christian church and Christianity have nothing in common save in name: they are utterly hostile opposites. The churches are arrogance, violence, usurpation, rigidity, death; Christianity is humility, penitence, submissiveness, progress, life.”

In 1900, he wrote, “Laws are rules established by men who control of organized violence for the nonfulfillment of which those who do not fulfill them are subjected to personal injuries, the loss of liberty, and even capital punishment. (More **Tolstoy** 1908, 57)

1899
Veblen:
The Theory
of the
Leisure
Class

Social criticism: **Thorstein Bunde Veblen** (1857-1929), American economist, professor, Socialist, wrote *The Theory of the Leisure Class*, a scathing indictment of the wealthy as shallow, trivial, ridiculing all public veneration they enjoyed. He used the phrase Conspicuous Consumption to describe the ostentatious spending of money merely to show others that the spenders have wealth. He said such spenders were insecure.

He ridiculed also the rich’s *Conspicuous Leisure* and *Conspicuous Waste*, all to the same end. The more useless the activity, the greater the prestige. Fox hunting for example ranked above deer hunting as the deer can actually be eaten. “The role of the leisure class in social evolution is to retard the movement and to conserve the obsolescent.”

Rich women
dress to
show they
can’t do
useful work

Veblen said that women’s fashions were designed to show that the woman could not do anything actually useful in her dress. Politically the upper classes were conservative. “This conservatism of the wealthy class is so obvious a feature that it has even come to be recognized as a mark of respectability.” “Conservatism, being an upper class characteristic, is decorous; and conversely, innovation, being a lower-class phenomenon, is vulgar.”

“By virtue of its high position as the avatar of good form, the wealthier class comes to exert a retarding influence upon social development far in excess of that which the simple numerical strength of the class would assign it. (Adam Smith had also ridiculed this upper class behavior.)

The lower
classes are
the most
devout

Economics: **Veblen**, “The accumulation of wealth at the upper end of the pecuniary scale implies a privy on at the lower end of the scale.” “As a general rule, the classes that are low in economic efficiency, or in intelligence, or both, are particularly devout—for instance, much of the lower class foreign population, and much of the rural population.”

Conspicuous consumption by the rich continued, unfazed by **Veblen’s** ridicule, but his numerous books of social criticism had a strong continuing influence in social thought.

1899
Leo 13:
Knowledge
stops here.

Fear of Dissent: Pope **Leo 13** (ref. 1878, ‘85, ‘91, ‘93, ‘96) condemned “Americanism” as a heresy. He killed any hope of democracy for the Church and efforts to adapt Catholicism to the modern world. He said, “The Catholic Church is not a philosophical theory that humans can elaborate, but a divine deposit that must be faithfully preserved.” He was the third longest serving pope, served til age 93.

1899
Rutherford

Physics: **Ernest Rutherford** (1871-1937), a baron, New Zealander, a professor at McGill, said radioactivity was the spontaneous disintegration of atoms. He saw three kinds of radiation which he named alpha, beta, and gamma particles, based on their penetration and deflection by a magnetic field. Alpha particles radiating from an element had the lowest penetration of ordinary objects. He determined that alpha particles were two protons bound together (and in 1912 proved they were the two-proton nucleus of a helium atom without helium’s two electrons. (More 1902)

1899 Psychoanalysis: **Sigmund Freud**, (1856-1939) *The Interpretation of Dreams* a groundbreaking work that said that dreams reflect the unconscious mind and are a means of understanding our deepest desires, anxieties, and fantasies. It discussed the symbolism of dreams and their connection to repressed thoughts and experiences, proposing that they are a form of wish fulfillment. (More **Freud** 1900-39)

1900-19 Age of Physicists Mendel deVries Einstein Shaw Planck Sinclair

Overview: Almost all universities before 1900 were founded by religions to teach religious beliefs.
Science exploded In the 20th century, science exploded. More scientists worked than all previous centuries combined. In Europe and America, the fear that Oriental peoples would overtake Caucasian superiority, the “Yellow Peril” paranoia was promoted relentlessly by, *inter alia*, **William Randolph Hearst’s** newspapers.

Newton’s physics still works for 99.9% of everything Physics: Certain phenomena conflicted with Classical Newtonian physics. Specifically,
1. The heat capacity of molecular gasses. 2. Radioactivity showed matter was subject to eruptions of instability. 3. Mercury’s orbit didn’t follow **Newton’s** laws. 4. **Newton** physics didn’t explain light and other radiation emitted from atoms. 5. **Newton** mechanics didn’t work for particles within atoms, i.e., sub-atomic or sub-molecular phenomena, Even so, Newtonian physics still works for 99.9% of everything.

1900 Burbank Improved agriculture philosopher Botany, philosophy: **Luther Burbank** (1849-1926), pioneered plant breeding. He created many productive varieties of fruits and vegetables. Regarding Christianity, he wrote, “The *Bible* is an incomplete history and the folklore of an ancient race, but no more.” “Justice, love, truth, peace and harmony, a serene unity with science and the laws of the universe.”
“The idea that a good God would send people to a burning Hell is utterly damnable to me. The ravings of insanity.” “The greatest torture for most people is to think. The tendency is to conform.”

1900 Biology, Heredity: **Hugo de Vries** (1848 -1935) Dutch botanist, and one of the first geneticists, known chiefly for suggesting the concept of genes, the theory that specific particles in cells which he called pangenesis caused specific characteristics in organisms. He developed his theory apparently unaware of **Gregor Mendel’s** 1865 work. In 1889, he published *Intracellular Pangenesis* in which he posited that different characters have different hereditary carriers (genes). He specifically said that inheritance of specific traits came in particles. In the late 1890s he became aware of **Mendel’s** work and melded **Mendel’s** work in his. He discovered that random genetic mutations was the mechanism of evolution. At first he did not credit **Mendel** but after criticism acknowledged **Mendel’s** priority of his theories.

Mendel’s 1865 heredity principles became widely known only in 1900 Heredity, Genetics: Recall, **Gregor Johann Mendel** (1822-84) had in 1865 discovered that certain specific traits in plants were controlled by one of a pair of entities (that in 1913 were given the name genes), from one or the other parent. His eight years of experiments disproved the then universal belief (including **Darwin**) in blended inheritance. He cross-pollinated tall and short pea plants and got all tall plants, no short or medium size. Then he pollinated the new tall hybrids with themselves and got 3/4 tall plants. Thus certain traits (like tallness) are controlled by discrete factors (genes) from one parent rather than being a blend of both parents. One in four plants

Laws of Heredity would have purebred recessive alleles (shortness), creating a short plant; two were hybrids (creating tall plants), one would be pure-bred dominant.(tallness, i.e., 3/4 will be tall). He thus discovered five still valid heredity principles that apply to all living things, plants and animals:

1. Each physical characteristic of a living organism is the product of a specific hereditary gene.
2. These genes exist in pairs in living things. The mother’s pair may have a gene for green eyes and a gene for hazel eyes, and the father’s pair may have a gene for green and a gene for blue.
3. For each characteristic (i.e, eye color), only one of the mother’s (green or hazel) and one of the father’s green or blue) will be passed to the child. So there are four possible combinations. G/G, G/B. H/G, H/B.4. It’s 50-50 which of the two genes regulating a specific characteristic of each parent gets passed down. Characteristics are never a mixture of genes
5. Some traits are *dominant*; some are *recessive*. So if the green gene were dominant over the blue or hazel gene, and if the blue gene were dominant over the hazel gene, then 3/4 of the offspring would have green eyes and 1/4 would have blue eyes.
This three to one ratio is a fundamental law of heredity.

De Vries posited that genes mutate.

De Vries posited that particles (genes) determine specific physical characteristics of an organism (like eye color or height.) and, citing **Mendel**, developed a theory of species change.

Specifically, almost always genes in a parent replicate themselves exactly, but on rare occasions, a particular gene replicates itself not exactly. That gene from either parent when it becomes part of a new fetus will cause the particular feature it controls (eye color, height) in the new offspring will have a different characteristic (eye color, height) than its parent.

De Vries said that mutations / changes of a gene thus cause an offspring to have a distinct variation (confirming **Mendel's** work). This one offspring can be a male or female of a new species.

What causes such changes/ mutations in a gene? **Vries** didn't know. (Partially answered in 1953)

New species don't have to be the fittest, just fit enough to survive and reproduce.

Survival of the changed offspring: As the changes in genes are random, they cause randomly 1. immaterial or 2. fitter or 3. less- fit to survive offspring. Such new or modified species offspring that is fit or fitter to survive, survives and reproduces with his or her different characteristic.

A new or modified species offspring that is *less-fit* to survive simply dies out. So, almost all species that ever lived consisted of just one *less-fit* offspring that just died. How are there so many species? Mutations are rare. Most have no effect on the species so the species just goes on and the one offspring with a different useful characteristic has offspring with his or her new characteristic.

A rare new species doesn't have to be *better-fitted* to survive, just *fit enough*.

Giraffes didn't develop long necks and legs in order to eat high leaves. This would imply a *purpose* to a genetic mutation. A shorter-necked and shorter-legged animal, by a random genetic mutation, had a longer-necked and longer-legged baby, a new species, **giraffe**. It then survived in part as it could eat higher leaves (better fitted). It then produced longer-necked and longer-legged offspring which thrived.

1900 **Mendel's** 1865 discovery of the principles of heredity only joined the wide body of knowledge through de Vries's Intracellular Pangenesis. All scientists now saw *how* new species came into being. So **Mendel** revolutionized biology and thus founded the science of genetics after he died.

Heredity, Selective breeding

Mendel and **de Vries's** random gene mutations ended *Lamarckism*. *Lamarckism* is not genetics or eugenics. Eugenics is a discipline within genetics. It is simply basically *selective breeding*, no more, no less, which can make improved or new species far faster than the random wasteful process of natural selection. Selective breeding is widely used by farmers/ranchers. It is taught in *Animal Husbandry* courses in US universities. Bull semen is a big business in the US. Horse race champions earn high stud fees. In New Zealand, one sees road signs, "Rams for sale, triplets only."

1900 Quanta

(January) Physics: **Max Planck** (1858-1947), Jewish, Berlin U. theoretical physics professor, editor of the well regarded physics journal *Annalen der Physik*, had experimented with the radiation of light in various frequencies. All objects radiate electromagnetic waves. Hotter objects emit a greater spectrum of such waves, including light waves. Black objects absorb all frequencies of electromagnetic radiation, and thus should radiate out all frequencies equally, but did not. He suggested the total energy of a collection of oscillators (atoms and molecules vibrating) have discrete values.

From this, **Planck** deduced that radiation from black bodies only worked if light emanated in discrete particles. This explained the problem of "black body" radiation. **Planck** called the particles he posited *quanta*, plural of *quantum*. A quantum is an infinitesimal packet of energy.

Quantum mechanics applies only to sub-atomic particles

Planck showed that the *intensity* of radiation varies very strongly with the *frequency* of the radiation. He thus formulated a revolutionary new quantum theory, that all energy, including light, consists of particles / quanta of energy whose strength is proportional to the frequency of the radiation.

An object can have one or a million quanta, but not 1.5 quanta, i.e., energy moves not in waves but in particles (objects that make up an atom) that can't be divided. (See Physics- **Lenard** 1902)

Planck published his theory. In 1690, **Huygens** had showed that light traveled as a wave (as had **Thomas Young** (1803) and **Clerk-Maxwell** (1867)). Diffraction and interference were explained only if light acted as a wave. So, physicists had mostly left **Newton's light-is-particles corpuscular** theory in favor of **Huygens's light-is-a-wave** theory.) Light particles (called photons) are virtually pure energy with infinitesimal mass which allows for interaction at great distances. (**Planck** in 1922 said that his quantum theory had caused a huge radical break with classical physics (**Newton**)).

1900 How we think.	Psychological study: Sigmund Freud (1856-1939), Vienna, <i>The Interpretation of Dreams</i> contains his most important ideas. "Dreams are wish-fulfillment. Dreams disguise the wishes of the unconscious. Dreams are always important, always significant. Dreams express infantile wishes." It named and explained the <i>Oedipus Complex</i> .
Anatomy is destiny.	His book <i>Psychopathology of Everyday Life</i> , started a new way people thought about their minds. He modified the <i>Enlightenment's</i> confidence in reason. He showed the power of Man's unconsciousness. He said, "Poets and philosophers discovered the unconscious. I discovered, psychoanalysis, the scientific method [to study the unconscious]." <u>He was more controversial than Darwin.</u> He said that sexual desires and fears underlay everyone's minds, "Anatomy is destiny." i.e., men and women's bodies set their role in society. Freud felt that men unconsciously crave war, to kill, cruelly and brutally.
Freud Quotes Religions use guilt.	Psychology: "It would be nice if there were a God who created the world and was loving [but] in the long run, nothing can withstand reason and experience. When someone is freed of religion, he has a better chance to live a normal and wholesome life." Religion is an illusion and it derives its strength from the fact that it falls in with our instinctual desires."
Most humans are trash	"I have found little that is good about human beings. Most of them are trash." "The different religions have never overlooked the part played by the sense of guilt. What is more, they come forward with a claim to save mankind from this sense of guilt, which they call sin."
Dogmas reflect the ignorant early years of humans	"Religion is an attempt to get control over the sensory world, in which we are placed, by means of the wish-world, which we have developed inside us as a result of biological and psychological necessities. But it cannot achieve its end. Its doctrines carry with them the stamp of the times in which they originated, <u>the ignorant childhood days of the human race.</u> Its consolations deserve no trust. Experience teaches us that the world is not a nursery."
Freud	Not a socialist, he said that the premise of a communal system was untenable, namely that people were corrupted by capitalism, whereas in fact people are normally inclined to aggression and aspiration to private wealth is one of its instruments.
Ego, super-ego, and id	Freud divided the self into three co-existing parts. The <i>ego</i> perceives, learns, and acts consciously. The <i>super-ego</i> is the largely unconscious moral conscience created during childhood. The <i>id</i> is the repository of unconscious; it desires pleasure without limit and without regard for reality, like the Greek eros. He also said, "A personal god was nothing more than an exalted father figure, desire for such deity springs from infantile yearnings for a powerful, protective father, for justice, for life to go on forever." And, "Religion is comparable to a childhood neurosis. <u>It is an "infantile delusion."</u>
Religion is an infantile delusion.	
Blows to man's ego	He said humans had received three staggering blows to their arrogant narcissistic self-image. Copernicus took humans out of the center of the world. Darwin showed humans their kinship to animals. <u>He, Freud,</u>
1900-1939	<u>had shown the power of Man's subconscious.</u> Stephen Jay Gould (ref.1972, '97) suggested that Freud omitted that advances in geology and paleontology had already displaced the comforting <i>Bible</i> stories.
	Freud , "It sounds like a fairy-tale, but not only that; this story of what man by his science and practical inventions has achieved on this earth, where he first appeared as a weak member of the animal kingdom, and on which each individual of his species must ever again appear as a helpless infant. . . is a direct fulfilment of all, or of most, of the dearest wishes in his fairy-tales."
	Psychiatry: Arthur Adler (1870–1937) Viennese, was second to Freud in fame as a psychiatrist, a medical doctor, psychotherapist, and founder of the school of individual psychology. He stressed the importance of feelings of belonging, relationships within the family, and birth order, different from Freud and others. He said that contributing to others gives an individual a sense of worth and belonging in the family and society. He said a child's very first years were all important.
1901 The Riddle of the Universe	Philosophy: Ernst Haeckel , (ref 1862), in <i>The Riddle of the Universe</i> , "The great cosmic law applies throughout the whole of nature, is of the highest moment . . . It definitely rules out the three dogmas of metaphysics, God, freedom, and immortality. . . . The enormous progress

of natural science is irresistibly destroying the roots of all church dogmas. . . .The victory of pure reason over superstition will not be achieved without a tremendous struggle."

Blood groups Chemistry, biology, blood groups: **Karl Landsteiner** (1868-1943), Austrian, discovered that blood had different groups, and blood from one group kills red cells of another group.

1901 India: **Rudyard Kipling's** *Kim* described detailed honest little known lives of lower castes of India.

Survival of the fittest is due to mutual aid, not fighting Political Theory, anarchism: **Petr Kropotkin** (1842-1921), Russian anarchist, articulated a Russian view of the survival of the fittest. His theory was that the struggle for existence usually leads to mutual aid rather than combat as the chief criterion of evolutionary success. "There is no bitter struggle for existence among animals of the same species. . .Wherever I saw animal life in abundance, I saw mutual aid and mutual support done to an extent I thought it most important for survival." The Russian school of *Darwinism* criticized **Malthus's** dismal views.

The Social Contract is a myth. Political Theory: **H G Wells** (1866-1946), Brit, historian, said, "The *Social Contract* [**Hobbes, Locke, Rousseau,**] is nothing more or less than a vast conspiracy by humans to lie to. . . themselves and one another for the general good. Lies are the mortar that binds the. . . individual Man into the social masonry."

1902 Why do religions need to torture people? Wells: "One could ask, why did theologians who claimed to be disciples of a powerful benevolent God, find it necessary to imprison, kill, and torture persons who did not accept their religion."

(Recall, **Augustine** said that torture was fitting for those who broke the laws of God. Heretics should be examined by beating them to death.)

Racism Wells's answer, "It was just because many of the church leaders probably doubted secretly of the entire soundness of their vast and elaborate doctrinal fabric that they would brook no discussion of it. They were intolerant of questions or dissent, not because they were sure of their faith, but because they were not."

His 1901 book, *Anticipation*, and 1905 book *A Modern Utopia*, were racist and advocated "control" of "inefficient" races, i.e., Black, yellow and "the Jew" by means of infanticide, abortion, and sterilization.

1902 Resist not Evil Law, Justice: **Clarence Darrow** (1857-1938) America's greatest lawyer, wrote *Resist Not Evil*, his most significant contribution literary to society. It was a comprehensive, sweeping, compelling, and unsettling case against the criminal-justice system. He was an attorney by training. He saw the entire machinery of law as a gigantic fraud, a purveyor of injustice, a producer of criminality itself.

How? He said that the state cannot plan the economy and it "furnishes no machinery for arriving at justice." He said that it taxes people more than brings in compensation. It ruins lives instead of righting them. It cares nothing about victims and instead makes more of them.

Darrow even argued that the state attempts to create more criminals rather than stopping crime. "*Darwinism* was a greater blow to man's psyche than heliocentrism." As *Darwinism* became widely accepted, some Christian theologians began to say *Natural Selection* supported the *Bible*.

Photoelectric effect Physics: **Phillip Lenard** (1862-1947) saw when light shone on a solid surface, electrons emit with top velocity independent of the light's intensity & goes up as the frequency of the light. **Einstein** used this in 1905.

1902 Heredity: **Walter Sutton** (1877-1916), American geneticist, in *The Chromosomes in Heredity* gave the first solid evidence that chromosomes carry the units of inheritance and that they occur in distinct pairs.

Biology, heredity: **Siddharta Mukherjee** (1970-) said, "The rediscovery and widespread knowledge of **Mendel's** laws of heredity in the opening weeks of the 20th century sparked a scientific quest to understand the nature and content of genetic information that has propelled biology for the last hundred years." The scientific progress regarding heredity made [since that time] falls naturally into four main phases, corresponding roughly to the four quarters of the 20th century."

Phases of the advance of knowledge of heredity in the 20th century 1900-1925: established the cellular basis of heredity: the chromosomes.
1926-1950: defined the molecular basis of heredity: the DNA double helix.
1951-1975: unlocked the informational basis of heredity (the genetic code), with the discovery of the biological mechanism how cells read the information contained in genes, and with the invention of the recombinant DNA technologies of cloning and sequencing by which scientists can do the same.

1976-2000. The sequence of the human genome, the project asserted, marked the starting point of the fourth phase, Genetics. This was the period of "genomics"the assessment of the entire genomes of organisms, including humans.

Airplane 1903 Aeronautics: Various persons around the globe were trying to build flying vehicles. After years of study and experiment, **Wilbur and Orville Wright**, bicycle makers from Dayton, Ohio, built a glider with propellers. **Wilbur** piloted their craft on December 17 at Kitty Hawk, N. Carolina for 12 seconds and 40 yards (half the length of a 747). Their crucial insight? They perfected the guidance and control systems, ailerons and rudder, which other experimenters ignored.

There are accounts that **Richard Pearce** (1877-1953) a New Zealand farmer, on March 31, 1903, flew a bamboo and tubular steel aircraft for about fifty yards. His craft had flaps on its wings, a rear elevator, a tricycle undercarriage, a steerable nose wheel, a horizontally opposed two cylinder gas engine, and a propeller with variable-pitch blades.)

The Geographical Pivot of History 1904 Geography: Sir **Halford MacKinder** (1861-1947) delivered a short paper to the Royal Geographical Society, *The Geographical Pivot of History*. He considered Europe, Asia, and Africa to be one "World Island." He said, "Who rules East Europe commands the Heartland. Who rules the Heartland commands the World Island. Who rules the World Island commands the world."This was all wrong, but it greatly influenced German nationalists for decades. His significance was that he provided a global concept of the world. It laid the foundations of modern geopolitics.

Geography has been crucial in world history, as **Jared Diamond** has shown in *Guns, Germs, and Steel*. **Will Durant** wrote that "the influence of geography diminishes as technology grows and when air power replaces sea power which will be one of the basic revolutions of history."

MacKinder also erred in not recognizing the immense power of the United States.

Religions are not needed Political Theory, theology: **Ito Hirobumi**, Four-time PM of Japan, Religion is "quite unnecessary for a nation's life. Science is far above superstition. Religion, Buddhism or Christianity, is simply superstition, and therefore a source of weakness to a nation."

The Trans-Siberian railroad was completed Moscow to Vladivostok (5772 miles, eight days.)

1905 Medicine: **Samuel H Adams**, an American muckraker, published *The Great American Fraud*, a damning expose of medical fakes. It named fake practioners, gave the alcohol & narcotic content of fake cures and exposed how magazines profited with advertisements they knew were false.

Constitutional Law: **Oliver Wendell Holmes**, (ref. 1894) "A Constitution is not intended to embody any particular economic theory. General propositions do not decide concrete cases." (More **Holmes** 1919, '29)

Protestantism helps capitalism Sociology: **Max Weber** (1864-1920) German sociologist, and **R H Tawney** (1860-1962), Brit, historian, said that Protestantism's emphasis on piety and work benefitted capitalism [and capitalists.]. **Weber** named three kinds of authority, 1. charismatic (family and religions), 2. traditional (kings, feudalism), and 3. Legal (the modern state). He said, "Philosophy is useful as only it can validate the concepts, such as the person, through which we understand and act."

Laws of Thought are fundamental & necessary Epistemology: **James Welton**, professor at Cambridge "The laws of thought are those fundamental, necessary, formal, and a priori laws which all valid thought must obey. They are *a priori*, that is, they result directly from the processes of reason itself exercised on the facts of the real world.

They are formal; for, as necessary laws of all thinking, they cannot, at the same time, ascertain the definite properties of any particular class of things, for it is optional whether we think of that class of things or not. They are necessary, for no one ever can conceive of them false, or validly violate them.

Christianity nursed furious hatred of heretics. Religion: **George Santayana** (1863-1952), Spanish American philosopher, said, "Christianity burned persecuted, and tortured. Like a hound, it tracked the very scent of heresy. It kindled wars and nursed furious hatreds and ambitions. It sanctifies extermination and tyranny, quite like Mohammedism. All this would have been impossible if, like Buddhism, it had I looked only for peace and the liberation of souls." "My atheism, like that of Spinoza, is true piety toward the universe and denies only gods fashioned by man in his own image to be servants of their human interests."

Men made the gods	<u>Philosophy: Julian Huxley</u> : (ref. 1859) grandson of Thomas Huxley , “God, equally with gods, angels, demons, spirits, and other spiritual small fry, is a human product arising inevitably from ignorance.”
1905 Einstein	Physics: Albert Einstein (1879-1955), theoretical physicist, born in Ulm, under age but attended the renowned Polytechnic Academy in Zurich at 16 by writing a paper on electromagnetism that foreshadowed relativity. He graduated brilliant and iconoclastic. In 1902, he became a patent examiner in Berne. To make ends meet, he tutored students only 2-3 years younger than he.”
Photo-electric effect	1905 At 26, Einstein published four <u>extraordinary papers</u> on different subjects in <i>Annalen der Physik</i> , (1900). <u>Paper 1, (June)</u> . He wrote that <u>light shining on a solid metal knocks electrons out of the metal</u> (creating an electric current) with a velocity independent of the light’s intensity. This accounted for the propagation of light without relying on an “ether.” This could only happen if light interacts with matter as <i>particles</i> of energy. Einstein thus used Planck’s (ref. 1900) and Newton’s <i>light-is-particles</i> theory that had been replaced in the minds of most physicists by Huygen’s <i>light-is-a-wave</i> theory.
Quantum theory	Planck : If light is composed of particles, with energies proportional to frequency, then the atoms in a metal surface would only be affected by <u>intact quanta / particles</u> / corpuscles with enough energy.
Particle / Quantum theory of light	Long wave-length (low frequency) particles/quanta do not have enough energy to eject an electron from the metal, no matter how intense the light. So, as wave-lengths grew shorter, the energy in a particle / quantum grew larger, and a point would be reached where the energy was just enough to dislodge an electron from the metal. As <u>light is energy given off by matter</u> , its <u>propagation must ultimately trace to the release of energy at the atomic level</u> .
Light acts as particles and waves	1905 Einstein and Planck agreed with Newton that <u>light was made up of particles</u> , This had been largely replaced by Huygen’s wave theory. But, particles, i.e., quanta, explained the photoelectric effect, which Huygen’s waves did not. Huygens’s waves better explained diffraction, refraction, and reflection (1690- Huygens) and the shadows on the fringes of shadows (1803- Young). <u>How was this reconciled? They were both right. Light acts as waves and as particles.</u> Einstein’s photoelectric theory helped validate Planck’s quanta theory. Einstein won his Nobel for this in 1922. This article effectively created quantum mechanics.
Brownian Motion	<u>Paper 2, (July)</u> , Brownian Motion (the constant motion of particles suspended in liquid) showed that molecules existed. This verified Dalton’s 1808 kinetic theory of molecules and furthered the acceptance of the concept of the atom. Einstein proved the reality of
	1905 these molecules and their motions by producing the first statistical physics analysis of Brownian motion. He also explained how to measure the size of liquid molecules.
Special Relativity: Space-time is the 4th dimension	<u>Paper 3, (September)</u> , <i>On the Electrodynamics of Moving Bodies</i> contained his <u>special theory of relativity</u> . Its central idea was that the passage of time was not absolute, a universal belief at the time. Einstein had decided that the <u>speed of light / electromagnetic waves was constant irrespective of the motion of the observer</u> . If the speed of light were constant, <u>time could not be</u> . This added <u>space-time as the fourth dimension of the universe</u> .
If light speed is constant, time can’t be.	Einstein’s theory was influenced by Karl Pearson’s (ref. 1880, 1892) <i>The Grammar of Science</i> , by Ernst Mach (ref. 1886), and by Lorentz’s work on electromagnetism (ref. 1895). Einstein proposed a radical theory that <u>the independence of an observer’s state of motion on the observed speed of light required fundamental changes to the notion of simultaneity</u> . Einstein completed Lorentz’s work on space-time transformations and relativity was born.
	1905 Einstein applied Lorentz’s equations to all events in space and time. The consequences of this include the space-time frame of a moving body slowing down and contracting (in the direction of motion) relative to the frame of the observer. <u>In relativity, mass and energy are two forms of mass-energy</u> .
Electro-magnetic waves are the universe’s only constant	Einstein <u>said the speed of electromagnetic waves (including light) was the universe’s only constant</u> , that is, all electromagnetic waves go the same speed under all conditions and for all observers, as Michelson and Morley had stated 20 years earlier. Assuming this, and that the laws of nature are constant, <u>then time and motion are relative to the observer</u> . It came to be called <i>special</i> as it dealt only with things moving in an essentially unimpeded state, no gravity, thus moving at a constant velocity. Nothing can go faster than electromagnetic

waves. Contra **Newton** and everyone else, space and time are flexible forming space-time.

An inertial frame of reference is central to the theory of relativity. (velocity is speed in a specific direction)

Isaac Newton's theory accounted for the physics of motion and gravity. **James Clerk Maxwell's** theories explained electricity, magnetism, and light. But, both could not be true. **Einstein** did not accept **Newton's** need for an absolute space and time. But he did accept a basic axiom conceived by **Galileo** and accepted by **Newton**: the concept of *inertial frames*. In classical physics and special relativity, (an inertial frame of reference is a frame of reference not undergoing any acceleration. This concept is central to the theory of relativity). It is a frame in which an isolated physical object—an object with zero net force acting on it—is perceived to move with a constant velocity or, equivalently, it is a frame of reference in which **Newton's** first law of motion holds.

All inertial frames are in a state of constant, rectilinear motion (straight line motion) with respect to one another. Visualize objects in a closed train moving at constant velocity. An accelerometer in the train would detect zero acceleration. Earth and the closed train are inertial frames of reference

Space-time looks and acts like a spacial dimension. It could be warped by gravitational fields. **Einstein** used *non-Euclidian* geometry to deal with space-time. This was first called the **Lorentz-Einstein** theory. He later wrote that **Lorentz's** work formed the basis for the general and special theories of relativity. This theory was a more detailed expose of those concepts in **Lorentz's** 1895 research.

Energy is mass liberated

Paper 4, (Nov.), an extension of Paper 3: The inertia of a body depends on its energy content. As *inertia* was previously considered to be mass times velocity, **Einstein** said that energy is mass liberated. So physicists learned the equivalence of mass and energy. **Einstein** wrote his theory as, "If a body [mass] gives off energy E in the form of [electromagnetic] radiation, its mass diminishes by E/c squared." This became widely known as $E = mc^2$

$E = mc^2$

E = energy
 c = speed of light.
 m = mass

Through all conversions of one kind of energy to another, mass-energy remains constant.

As energy is mass liberated, mass is a measure of a body's energy content. **Einstein** here treated light as a *wave* as **Huygens** had said. **Planck** had said light was *particles* and that the speed of light is finite. The energy of a light particle is proportional to the frequency of its radiation. As " c " is such a huge number, [186,282.396 mps], there's a huge amount of energy bound up in every bit of matter. If the atom bomb released all its energy. It would have obliterated Japan.

1906 (It was later determined that, according to $E = mc^2$, One gram of mass = c.85.2 Billion BTUs or 900 BB ergs of energy.) So stars/suns can fuse six hydrogen atoms into one helium atom, expelling energy / light quanta (photons) for billions of years without using up all their matter.

While $E = mc^2$ was not then proven experimentally, It has now been verified at MIT and other labs. **Einstein**: "If you can't explain it simply, you don't understand it well enough."

Third Law of thermodynamics

Thermodynamics: Walther Hermann Nernst (1864-1941), German chemist, discovered "the Third Law of thermodynamics (ref. 1847). As matter approaches absolute zero, all processes cease and entropy (unusable energy) approaches a minimum value." One can't get to *absolute* zero as one can't destroy energy or matter. The three laws of thermodynamics are known as, "You can't win; you can't break even; and you can't get out of the game." (*Fourth Law*, see 1935)

1906 Physics: Richard Oldham (1858-1936), Brit, discovered that earthquake waves travel through the middle of the Earth slower than through the mantle. He deduced that the core of the Earth is liquid. (It's mostly molten iron-nickel.)

Muckraker

Social criticism: Upton Sinclair (1878-1968), most influential and prolific US muckraker *The Jungle* exposed the filth in meat packers' factories in Chicago. He described the corruption of the meat packing industry and many unsanitary practices and inhumane treatment of the workers. It led to the Pure Food and Drug Act. **Sinclair** wrote almost 100 muckraking books. (See 1918-19)

Finley Peter Dunne, "I care not who makes the laws or the money . . . so long as I run the presses."

1906 **Franz Boas** (ref 1887) An anthropologist's job is to see how tribes & nations differ and how they got that way.

Physics: Bertram Boltwood discovered how to know the age of a rock, measure its radioactive decay.

- 1906** Physics: **Einstein** established relationships with **Hendrik Lorentz** in Holland, **Ernst Mach** in Austria, **Ernest Rutherford** in England, **Marie Curie** in France, **Max Planck** in Berlin, and other scientists. He considered how Newtonian physics would have to be modified to fit into his relativity idea
- Conservation of mass-energy** Physics: Before **Einstein**, physicists believed that there were two measures of mass, *gravitational mass* (weight) and *inertial mass* (the number of atoms in an object), the resistance of an object to change its course (its inertia or momentum). **Einstein** said there was just one kind of mass. He posited the complete physical equivalence of a gravitational field and the corresponding acceleration of a reference frame. (Next **Einstein** 1907)
- Mass-energy** Newton's Second Law of Motion, Momentum, is effectively the *Law of Conservation of Energy*. It had developed through the work of **Daniel Bernoulli** in 1738, **Michael Faraday** and **Emilie du Chatelet** in 1831, **Julius Robert von Mayer** in 1841, **Hermann von Helmholtz** (who had discovered the *First Law of Thermodynamics*) in 1847, **James Joule** and **Rudolf Clausius** in 1850, and by **William Thomson** and **Peter Tait** in 1867. **Einstein's** assumption extended the principle of relativity to the case of uniformly accelerated motion of the reference frame. **Lavoisier's Law of Conservation of Mass** and *The Law of Conservation of Energy* then merged to become the *Law of Conservation of Mass-Energy*.
- Special Relativity** The laws of conservation of mass and the conservation of energy remain valid in isolated systems. Special Relativity applies to mass at rest. That is, a rocket ship's instruments can't tell the difference between its acceleration and gravity's effects. This is the *Equivalence Principle* and from this came **Einstein's** General Relativity ("GR") in 1915.
- 1907 Philosophy: **William Graham Sumner** (1840-1910), sociologist, "The [Inquisition] destroyed honest thinkers and sincere churchmen and cultivated a class of smooth hypocrites and submissive cowards."
- 1907 Philosophy: **Mohandas Gandhi**, a Hindu lawyer in South Africa was influenced by **Thoreau's Resistance**.
- c.1907 Philosophy: **E W Scripps**, (1854-1926), American press lord, "God damn the rich. God bless the poor. I have only one principle, to make it harder for the rich to grow richer & easier for the poor to not get poorer."
- Einstein's career** **1907-11** **Einstein** became an instructor of theoretical physics at the Univ. of Berne retaining his job at the Patent Office. Due to **Planck's** enthusiastic endorsement, **Einstein's** ideas slowly gained him attention and respect, principally among German theoretical physicists. **Einstein** realized that if his 1905 theory of special relativity, namely, that if all accelerated frames of reference are equivalent, then *Euclidian* geometry could not be true in all of them. . In 1909, he became the newly established (for him) chairman of theoretical physics at the U. of Zurich. He lectured on electromagnetism, the kinetic theory of heat, and other subjects. In 1911, he became a professor at the German university in Prague, all the while speaking at scientific conferences and continuing his study of relativity. (See 1914 and 1915 *General Relativity*).
- All lives matter equally** 1907-75 Philosophy: **Eamon de Valera** (1882-1975), Irish revolutionary, then president of Ireland, said, "The killing of a human being is an awful act, but as awful when the victim is a humble worker or peasant as when the victim sits in the seats of the mighty and his name known in every corner of the earth. It is characteristic of our hypocritical civilization that it is in the latter case only we are expected to cry out and express our horror and condemnation." (**Aquinas** had said the killing of an important person was more serious than killing a peasant.)
- Lamentable Errors of the Modernists** 1907 Catholic fear of thinking: Pope **Pius 10** issued his syllabus, *Lamentable Errors of the Modernists*. It listed 65 "heretical" beliefs, basically those beliefs that said humans influenced Church dogma. One who believes a heresy goes to Hell. **Pius 10** thus rejected **Andrew White's** attempt to validate the *Bible* as the striving of mortal men to reach for higher moral values. **Pius** made all priests take an oath against modernism and those studying secularism or modernism had to stop. The oath required acceptance without question to all papal teaching and interpretations by the pope. He declared modernism itself a heresy and excommunicated its exponents. Seminarians could not read newspapers. He put all writings critical of Catholicism on the *Index*.

- 1907 **Biology: Henri Bergson**, (1859-1942), French, a popular public intellectual, philosopher, and a firm adherent of **Herbert Spencer**, (ref. 1852, '57, '59, '62. '70s, '194, p.401), posited that intuition was more important than intellect. His *Creative Evolution* attempted to integrate biological science with a theory of consciousness. He described the concept of an *elan vital* / *creative impulse*, a non-material force that provides the vital impulse that continuously shapes all life but whose existence cannot be scientifically verified.
- Creative Evolution**
- Elan Vital** He said that *elan vital* was the creative course of evolution, not **Darwin's** natural selection. Said also that intuition goes to the heart of reality and enables humans to find philosophic truth.
- Bergson's** work was for a time claimed to be the main challenge to the mechanistic view of nature. But **Russell** said **Bergson** could not explain how his intuition could work apart from intellect, and that **Bergson's** "*intuition* worked best in ants, bees, and **Bergson**."
- Julian Huxley** (ref.1859, 1905) said that **Bergson's** *élan vital* is no better to explain life than to explain a railway engine by its *élan locomotif*. *Elan vital* rightly faded from scientific interest. But the idea of a "life force" lives. Naturopathic "doctors" today say there's a "living force" called *vis*. In **Lao-Tse** Chinese medicine, it's *qi*. In Hindu Ayurvedic medicine' it's *prana*. One can today buy *Elan Vital* vitamin pills. One who believes in the supernatural can believe *anything*.
- 1908 After **Freud**, another blow to the Caucasian psyche came when Negro **Jack Johnson** easily beat **Tommy Burns** & the prior champion, **James Jeffries**, to become the world heavyweight boxing champion.
- Boxing**
- 1908 **Philosophy: Count Leo Tolstoy** (ref. 1532, 1865, '98), "Modern civilization exalts self-aggrandizement and self-gratification. It panders to sensuality in its art and its literature." (More **Tolstoy** 1957)
- Critic**
- 1908 **Evangelism: Billy Sunday**, a popular revival Christian evangelist, "I have studied the *Bible* from *Genesis* to *Revelation*. I have read everything that **Bob Ingersoll** has spouted. If **Bob Ingersoll** isn't in Hell (he had died in 1899), God is a liar and the *Bible* isn't worth the paper it's printed on. If a minister teaches evolution, he is a skunk, a hypocrite, and a liar."
- 1908 **Social Policy: Theodore Roosevelt** (1858-1919), *Message to Congress*, "The decisions of the courts on social and economic questions depend on their economic and social philosophies." In 1910, he wrote, "I believe in a graduated income tax on big fortunes . . . and another tax.. . which is far more effective - a graduated inheritance tax on big fortunes, properly safeguarded against evasion and increasing rapidly in amount with the size of the estate." (In 1901, as president, he had said of Native Indians, their existence was squalid, but a few degrees above wild beasts.)
- Tax the richest at the highest rate**
- 1909 **Racial politics: The National Association for the Advancement of Colored People** was formed in NYC.
- 1909 **Physics: Robert Millikan** said electrons have a mass of about 1/1836 of a proton. So barely affect weight.
- Homer Lea** (1876-1912), an American military genius, described how Japan would attack Pearl Harbor.
- History of Political Parties in New York** **Political Theory, class struggle: Carl Becker**, American historian. His *History of Political Parties in the Province of New York, 1760-76*, formulated a "progressive" interpretation of the American Revolution. He argued that there were in reality two revolutions, one to gain independence and the other to decide if the rich or the common people would rule. The rich won. He said that several rebel leaders had lent money to finance the rebels and would only have their loans repaid if the rebels won.
- 1910 **Pope: Pius 10** ordered all priests, teachers & administrators to swear an oath denouncing Modernism.
- 1911 **Physics: After Pierre Curie's** accidental death, **Marie Curie** isolated radium and won her second **Nobel** prize. She said, "Nothing in life is to be feared. only to be understood."
- Solvay Conference Top physicists** The first Solvay conference, Brussels: The most important talks were French physicist **Jean Perrin** who gave convincing circumstantial evidence that atoms existed and **Rutherford** (ref. 1899) who described the structure of an atom, with a nucleus. **Curie** attended. **Einstein** was the final speaker
- 1911 **Exploration: Hiram Bingham**, Yale professor, tipped off by natives, found abandoned ruins of Machu Picchu.

- 1911 **Mexico** Political Theory: **Ricardo Flores Magon** (1874-1922), Mexican anarchist, a leader of the Mexican Revolution. He said, "The only thing for which authority is needed is to maintain social inequality."
- 1911 **J P Morgan** Capitalism: **J P Morgan** (1837-1913) (ref 1865-profiters), as a banker he dominated US corporate finance throughout the *Gilded Age*. By 1900, he controlled 100,000 miles of railroads, half the total in the country. At one time he was a director of 48 corporations. He told the U S Commission on Industrial Relations that \$10 per week was enough for a longshoreman and his family to live on "if that's all he can get and he takes it." He was quoted saying "Well, I don't know as I want a lawyer to tell me what I cannot do. I hire him to tell how to do what I want to do."
- J P Morgan: Only fools pay taxes** **Morgan** said, "Congress should know how to levy taxes and if it doesn't know how to collect them, then a man is a fool to pay taxes."Anybody has a right to evade taxes if he can get away with it. No citizen has a moral obligation to assist in maintaining the government." He once bought a huge quantity of gold and shipped it to England so that a shortage in the U S would cause a price rise.
- 1911 **New model of the atom. Nucleus is tiny & dense** Physics, Chemistry: In 1909, **Hans Geiger** and **Ernest Marsden**, students of **Rutherford** (ref 1899, 1903), had bombarded a thin gold foil with alpha particles (two protons). Most went through easily but one in 8,000 bounced back.
So **Rutherford** concluded that the positively charged part of an atom, the part that caused the bounce back, was concentrated in a tiny very hard, very dense positively charged nucleus inside a vast empty space that contained the negatively charged electrons. He was first person to describe the structure of an atom, with a tiny dense nucleus of protons with electrons orbiting around the nucleus.
 This was the new model supplanting **J J Thomson's** 1897 "plum pudding" model. The nucleus of an atom is only one billionth of one millionth of the full volume of an atom but is 99.995% of an atom's mass (like a pearl in the SuperDome).
- Physics: Sir **Arthur Eddington** (1882-1944) Brit, astronomer, physicist, mathematician, was famous for his work on the theory of relativity and stars. He called **Rutherford's** model the greatest change in our idea of matter since the time of **Democritus**.
Eddington said, "One of man's oldest riddles, namely, How can the independence of human volition be harmonized with the fact that we are integral parts of a universe which is subject to the rigid order of Nature's laws?" (more **Eddington** 1914-19,15, 26 30, 33)
- 1912 **Redshift Blueshift** Physics, Astronomy, Redshift, Blueshift: **Vesto Slipher** (1875-1969), at the Lowell Observatory, Arizona, saw light from *nebulae* (cloudy blobs of light, not distinct stars, **Messier** objects, ref 1774). He measured their redness or blueness compared to light from the Sun (presumed to be a fixed distance from Earth).
Fizeau in 1848 had confirmed **Doppler's** theory that light from stars going away from Earth would appear redder as the red end of a star's light spectrum had a lower frequency-longer wave length (less waves per second) than the blue end of sunlight's spectrum.
Fizeau & the Hugginses in 1868 had said that the redness was because the visible electromagnetic waves, i.e., its light waves, of such nebula receding from Earth would be spread out to the lower frequency red end of sunlight's spectrum, and thus appear redder. Conversely, approaching light would appear to be the shorter blue wave length end of light's spectrum. (See 1915 **Slipher**).
- c.1912 **Knowledge of plate tectonics before 1912** Geology, plate tectonics: **Benjamin Franklin** had said that the crust of the Earth could be like a shell, disturbable by interior forces.
 In 1908, **Frank Bursley Taylor**, American geologist, had proposed that the continents once drifted around and that the crunching together of continents' plates pushed up mountain ranges. In 1912 **Alfred Wegener**(1880-1930), German, saw how Africa and South America fit together and speculated they were once one. He published his theory of continental drift.(More **Wegener** 1915)
- 1912-3 **Faith is belief without** Philosophy: **Bertrand Russell** (1872-1970), (ref. 1600, '20, '70, 1710, '52, '62, '81, 1907), a lord, philosopher, pacifist, agnostic, and mathematician. **Russell** took **Einstein** literally and concluded that there is no substance; everything in the universe is made of space-time events, and events

evidence are neither physical nor mental. Mind and matter are different ways of organizing space-time.
He said "The word "cause" is so inextricably bound up with misleading associations as to make its complete exclusion from the philosophical vocabulary desirable."

All faiths do harm. Russell Quotes "Christians hold that their faith does good, and other faiths do harm. I say all faiths do harm. We define faith as a firm belief in something for which there is no evidence. When there is evidence, no one speaks of faith. We do not speak of faith that two and two are four, or that the Earth is round. We only speak of faith when we wish to substitute emotion for evidence."

Men fear thoughts. Most people would sooner die than think. They do so. "Men fear thought as they fear nothing else on Earth –more than death. Thought is subversive, revolutionary, merciless to privilege, established institutions, and comfortable habits."
"If thought is to become the possession of many, and not just the privilege of the few, we must have done with fear. Fear holds men back lest they should prove less worthy of respect than they have supposed themselves to be." "I myself would never die for my beliefs as I may be wrong. Most people would sooner die than think. In fact, they do so."

1913 The Problems of Philosophy **Philosophy: Russell's** *The Problems of Philosophy* said, "Philosophy is to be studied not for the sake of any definite answers to its questions, as no definite answers can, as a rule, be known to be true, but rather for the sake of the questions themselves."
The goal of such study is to become a free intellect, an intellect that will see as God might see, without a *here* and *now*, without hopes and fears, without customary beliefs and prejudices."
"If philosophy cannot answer so many questions as we could wish, it has at least the power of asking questions which increase the interest of the world, and show the strangeness and wonder lying just below the surface even in the commonest things of daily life. Science is what we know, philosophy is what we don't."

Russell "Preoccupation with possession, more than anything else, prevents men from living freely and nobly."
We must be skeptical even of our skepticism "We must be skeptical even of our skepticism." "Patriotism is the willingness to kill and be killed for trivial reasons." "The finding of arguments for a conclusion given in advance is not philosophy but special pleading. This discredited virtually all theological writings.
Philosophy, like all other fields of study, aims primarily at knowledge. The kind of knowledge that gives unity and system to the body of sciences [such as natural laws], and the kind which results from a critical examination of the grounds of our convictions, prejudices, and beliefs."

1913 Whitehead Quotes **Philosophy, Math: Alfred North Whitehead** (1861-1947), Brit, mathematician, philosopher. With **Russell**, and **Guiseppe Peano** extended algebra from symbols for numbers to symbols for concepts, creating symbolic logic. **Whitehead** said, "God? He has been named Jehovah, Allah, Brahma, Father in Heaven, Order of Heaven, First Cause, Supreme Being, Chance. Each name corresponds to a system of thought derived from the experiences of those who have used it."
"He has been conceived as the foundation of the metaphysical situation with its ultimate activity. If this conception be adhered to, there can be no alternative except to discern in Him the origin of all evil as well as of all good. He is then the supreme author of the play, and to him must therefore be ascribed its shortcomings as well as its successes."

The Christian heaven is idiotic. Also, "I consider the Christian theology to be one of the great disasters of the human race . . . It be impossible to imagine anything more un-Christian than Christian theology. Christ probably couldn't have understood it." "Can you imagine anything more appallingly idiotic than the Christian idea of Heaven? What kind of deity is it that would create angels and men to sing his praises day and night to all eternity? Such a conception is an insult to God." (As previously noted, for most people at the time, it probably was better than the pain of stoop labor in a field working from dawn to dusk til you die.)

1913 Why philosophy? **Whitehead** said there was a no humor in the *Bible*. And, "We think in generalities, we live in detail."
Philosophy is the endeavor to frame a cogent logical necessary system of general ideas in terms of which every element of our experience can be interpreted." "All truths are half truths." "In the conditions of modern life the rule is absolute, the race which does not value trained intelligence is doomed."

Process Theology A new religious philosophy, *Process Theology*, was influenced by **Whitehead's** metaphysical *process philosophy*. It holds that God in *some* respects does affect and be affected by temporal

processes, contrary to the theism that says God is in *all* respects eternal, unchanging, and unaffected by the world. It does say that God's *eternal aspect* is unaffected by actuality.

God is not the classical God

Its major concepts are that the *Bible* was a fallible history book. **Jesus** was a moral leader but not divine. God is not omnipotent in the sense of being coercive, but can persuade. Reality is not material substances but is serially related events, which are experimental in nature. These events have both a physical and mental nature. All experience is important and contributes to the ongoing and interrelated process of reality. God is incarnate in everyone's life when one acts in a godlike manner. As it denies **Jesus's divinity**, it is not accepted by major Christian religions.

Behaviorism

Nurture, not nature

Psychology: **John B Watson** (1878-1958), American psychologist, started the psychological school of behaviorism. **Environment is all important**, natural ability immaterial, "Give me 12 healthy infants, well-formed, and my own specified world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select—doctor, lawyer, artist, merchant-chief regardless of his talents, penchants, abilities, vocations, or race of his ancestors."

1913 Behavioral psychology: is the field that asserts that all animal and human behavior results from responding to stimuli, i.e., the environment. It uses only unambiguous and measurable behavior. It began to dominate psychology, principally in North America, largely based on the argument that to be a proper science, psychology must concentrate on observable, measurable, overt behavior.

American wealthy protected their property.

Private property rights superior to government

Political Theory, class struggle: American historian **Charles Beard's** *An Economic Interpretation of the Constitution* continued **Carl Becker's** (ref. 1909) and **Karl Marx's** (ref. 1848) "progressive" interpretation of history which holds relevant the personal interests / motivations of the persons involved. **Beard** asserted that the wealthy class of men writing the *Constitution* were mainly protecting their property, that is, they would derive financial advantages from features of the new government that the Constitution they were writing would establish. "The *Constitution* . . . was based on the concept that the fundamental rights of private property are superior to government and morally beyond the reach of popular majorities." Women, slaves, and persons without property were of course never considered for participation in the framing the *Constitution*.

The founders of America *were* the wealthy. Ten of the first 12 presidents owned slaves. The *Constitution* condoned slavery and the subjugation of women by being silent, **and** did not give the propertyless the vote. Politicians and academics denounced **Beard** for "dethroning the founders from American sainthood." (Which he did, which they deserved). **Beard** answered, "The germinal idea of class and group conflicts in history appeared in the writings of **Aristotle** long before the Christian era.

It was stated by **James Madison** in *The Federalist* 10. . . long before **Karl Marx** was born."

Beard's analysis made historians seriously consider the economic interests of historical figures.

Karl Marx

Thomas Piketty

Political Theory, economics, psychology: **Karl Marx** had said social classes were the driving forces in history; that social classes act in their economic interests. **Marx** was half right. Specifically, **Thomas Piketty**, a current French economist, says, "The rich never fail to defend their interests," they protect their power and wealth. "In democracies, the wealthy use their control of media and the clergy to influence the lower classes to vote not in their actual economic interests, but on emotive issues" like patriotism, foreigners, persons on welfare, guns, communists. (See 1532- *Force, Fraud, Favors*).

1913 Two kinds of carbon

Chemistry, physics: **Frederick Soddy**, (ref. 1903) a former student of **Rutherford**, discovered that there appeared to be more than one type of atom at each position on the periodic table. That is, different weights of the same element, They were then named isotopes. (Carbon 12 has 6 protons & 6 neutrons (atomic weight 12). Carbon 14 has 6 protons and 8 neutrons (atomic weight 14).]

New model of atom. Electrons orbit at fixed distances from the nucleus.

Chemistry, physics: **Niels Bohr** (1885-1962), Dane, wrote *On the Constitutions of Atoms and Molecules*. He modified **Rutherford's** 1911 tiny dense nucleus model of an atom (which had replaced **J J Thomson's** 1897 plum pudding model). **Bohr** agreed with **Rutherford** that the nucleus was tiny and dense but added that electrons orbit the nucleus in fixed concentric spherical orbital areas (called shells) at fixed distances from the nucleus. Said that the "shells" have different energy levels at different distances from the nucleus. This explains how electrons' orbits are stable.

Electrons' orbits have different energy levels

He said electrons keep from falling into the nucleus only if they occupy specific spherical orbital distances from the nucleus. Atoms consist of only a tiny *nucleus* and electrons orbiting around the nucleus at fixed distances from the nucleus.

This improvement over the 1911 **Rutherford** model mainly concerned the new quantum physical interpretation. He introduced the idea that an electron could drop from a higher-energy orbit "shell" to a lower energy orbital "shell", in the process emitting a quantum of discrete energy. This became a basis for what is now known as the old quantum theory.

Electrons have higher energy when energy is forced into them

Bohr said that when an electron absorbs energy (energy being forced onto it), it jumps to a higher energy orbit, disappearing from one orbit and reappearing in the higher orbit without visiting the space in-between. It's the famous quantum leap. Fixed energy quantities (quanta) is the quantum theory of the atom. When the force goes away, the electron goes back to its previous orbital "shell", releasing energy in the form of light. An atom's structure became as mathematical as **Newton's** universe, but it contained also the principle of the quantum.

Bohr model of an atom outdated

The **Bohr** model is a relatively primitive model of the hydrogen atom, compared to the valence shell atom model to come. However, because of its simplicity, and its correct results for selected systems, the **Bohr** model was useful to introduce quantum mechanics or energy level diagrams for students. **Bohr's** model is still accurate for an atom's chemical characteristics. (He got the 1922 chemistry Nobel.)

Einstein's 1905 paper on the photoelectric effect was fundamental to **Bohr's** modification of **Rutherford's** 1911 modification of **Thomson's** plum pudding atom model (more **Bohr**, 1923, '27, '33)

1913 **Gustave le Bon** (ref 1895), "The fate of a people depends on their character, not their intelligence."

"The Ludlow massacre"

"our little cowboy governor"

1913-14 Capitalism, labor strife: The deadliest labor dispute in US history occurred in Southern Colorado when coal miners of the Colorado Fuel and Iron Company, a **Rockefeller** company in Pueblo, Colorado, went on strike. Their average pay was \$370 per year. The miners lived in company houses, shopped in company stores. When they struck, they were immediately evicted. They pitched tents in fields. CF&I had the governor send in the Colorado National Guard. CF&I paid their salaries. The Guard and private gunmen hired by CF&I, using machine guns, raided the tent colonies. At Ludlow, they destroyed a large tent settlement of 400 tents and 1000 miners' families and burnt the tents, arrested hundreds. The strike lasted over a year. The fighting was brutal. Some Guardsmen had refused to kill workers's families. After a year, the strikers ran out of money and gave up.

The **Rockefeller** mine manager referred to the governor as "our little cowboy governor." Estimates were that 69 to 199 people were killed during the strike. Ludlow is now a vacant field.

1913 Physics, chemistry: **Henry Moseley** (1887-1915) Brit, using a spectroscope (invented 1859) observed and measured the X-ray wave-lengths / spectra of various metals. He saw a systematic mathematical relationship between the wavelengths of the X-rays produced and the *atomic numbers* (protons only) of the metals that were used as the targets in X-ray tubes.

Like **Bohr**, he confirmed **Rutherford's** 1911 theory that atoms had a tiny dense positively charged nucleus, which dense part **JJ Thomson** said consisted of "protons."

Moseley determined the value of the nuclear charge of each element (number of protons).

This showed that **Mendeleev's** 1869 ordering of elements should place the elements in sequential order by *nuclear charge*, i.e., protons only, which would be the atomic number of each element, not the atomic *weight* of the element. (*weight* of all particles in an atom). Any other sub-atomic particles were then unknown. (See 1932-neutrons.)

1914 Periodic Table corrected to protons only. Atomic weight is all particles in an atom.

Chemistry: The number of protons in an atom determines what element it is. (When **J J Thomson** in 1897 discovered particles within an atom that had an electrical charge, scientists also theorized that there must also be particles in an atom with an opposite/ positive electrical charge.)

As Moseley determined, the Periodic Table of Elements was corrected from being based on atomic *weight* (weight of all particles of an atom) to atomic *number*, (protons only). (**Neil deGrasse Tyson** in 1997 said, "The Periodic Table of Chemical Elements is the organizing principle for the chemical behavior of all known and not yet discovered elements in the universe, as such it ought to be a cultural icon, a testimony to . . . science as an international human adventure

conducted in laboratories, particle accelerators, and on the frontier of the cosmos itself.”)

1914 Einstein in Berlin Physics: Planck (ref.1900), then dean at the U. of Berlin, hired **Einstein** as a professor. In Berlin, **Einstein** could there have the support of Germany's premier science association, the *Prussian Academy of Sciences*. He continued work on his new theory of *general relativity*. He said, “The entropy of each pure element or substance in perfect crystalline form is zero at absolute (**Kelvin**) zero.”(This is the *Third Law of Thermodynamics*.) **Einstein** criticized Germany's militarism.

1914 Eugene Debs Political Theory, socialism: Eugene V Debs (1855-1926), American socialist, “I have no country to fight for; my country is the earth. I am a citizen of the world. The master class has always brought war. The subject class has always fought the battle. The master class has had all to gain and nothing to lose, the subject class had all to lose and nothing to gain.”

Physics, Astronomy: Harlow Shapley (1885-1972) head of the Harvard Observatory 1921-52), used *cepheids* (stars whose brightness varies) to deduce that the overall shape of the *Milky Way* was a disc. Like all astronomers at the time, he thought that the Milky Way was the complete universe and that our solar system was on its outskirts.(See 1920) But some, like **Kant** (ref. 1755) and **Vesto Slipher**, had speculated that there were stars beyond the *Milky Way*.

1914 The Great War Political Theory, war: By 1914, the developed countries were money economies. A Serbian killed the heir to the Austro-Hungarian throne. Anger, alliances, miscues; global empires clashed. France and England fought Germany, Austro-Hungary, and Turkey. France secretly paid Italian Socialist, **Benito Mussolini**, \$40,000 to found a newspaper to influence Italy to join it. America, isolationist, declared neutrality. (More 1916-18)

1914 Physics, thermodynamics: Arthur Eddington (ref. 1912) said that the law saying entropy always increases (*Second Law of Thermodynamics*) is the highest law of nature. No law can contradict it. (more **Eddington** 1915. ‘19, ‘26, ‘30.’ 33) The Panama Canal opened. The world got smaller.

1915 The Origin of Continents and Oceans Geology: Wegener's (ref. 1912) book, *The Origin of Continents and Oceans*, said that the Appalachian Mountain range could extend through Nova Scotia and to Scotland and Scandinavia. He said that continents had drifted into their current locations from a large original continent (He named *Pangaea*). He noted other similarities across oceans. Geologists for 30 years discussed but rejected the idea of continental drift, saying there was no force strong enough to move continents. But the evidence for his theory gradually grew, and it was eventually accepted. It was found that not just continents move, but plates they are on do. So it's now called *plate tectonics*. (More 1944)

1915 Philosophy: D H Lawrence (1885-1930). The world fears a new experience more than it fears anything. Because a new experience displaces so many old experiences. . .The world doesn't fear a new idea. It can pigeon-hole any new idea. But it can't pigeon-hole a real new experience.

General Theory of Relativity “GR” Physics, astronomy: Einstein, then at the University of Berlin, rewrote the laws of gravitational physics After eight years of excruciating effort, he expanded on his *Special Theory of Relativity* (1905) to the *Cosmological Considerations on the General Theory of Relativity (“GR”)*, with an entirely new theory of gravity which purported to solve problems with gravity not explained by his *Special Theory*. It consisted of ten equations.

New theory of gravity **Einstein** posited that gravity is not a force between bodies (**Newton**) but is a distortion of the structure of time and space, a curved field in a space-time continuum that is created by the presence of matter affecting the inertial motion of other matter. An object literally bends the three dimensional fabric of the universe around it. Special Relativity applies to mass at rest.

General Relativity Physics: Einstein revealed his theory of *General Relativity (GR)*.It applied to a mass in motion. Physicists **David** and **Arnold Brody** explain the main predictions derived from GR include:

- 1915**
1. All electromagnetic radiation, including light, has mass, so is affected by gravity. (not much mass of course)
 2. Mercury's orbit is different from the orbit calculated by Newtonian physics.
 3. A clock on a massive object (like Earth) will run slower than a clock in free space.
 4. Gravity waves exist, radiating at the speed of light from large masses that are accelerating.
- The end result of GR expands physics to account for gravity and accelerated frames of reference

which leads to the conclusion that space is “curved” and that not only are space and time linked, but that the complete explanation of the universe combines space, time, and matter.

A flat universe has no stars. A curved universe has galaxies of stars

Einstein used *non-Euclidian* hyperbolic geometry developed by **Carl Gauss**, **Bernard Reimann**, **Nikolai Lobachevsky**, and others. Gravity, under certain circumstances, can alter the structure of space-time. *GR* says inertial mass (mass based on measuring acceleration) and gravitational mass (mass based on measuring gravitational intensity) are identical. *Special Relativity* deals with space with no mass, i.e., no stars, no galaxies, no black holes, i.e., a flat universe (which does not exist). *GR* deals with a “curved” universe, one with mass. *GR* was unknown outside Germany until after the Great War, when **Eddington** introduced it to non-Germans.

Absolute time and absolute space don't exist, but space-time does..

GR holds that neither absolute space nor absolute time exists; but absolute space-time does exist; and space and time are *not* inter-connected with the three normal Newtonian Euclidian spacial dimensions of length, width, and height.

GR theory is a set of 10 equations from which the degree of curvature of space-time can be predicted based on the amount and distribution of mass (stars, galaxies, black holes, etc. ref 1783) present. Newtonian physics still works in its domain, which is everything from atoms to galaxies.

General Relativity

Brian Silver, (1930-86), Israeli chemist, summed up *GR*, “In the inertial frames of classical physics and of special relativity, **Newton’s** laws are accurate in any frame, except accelerating frames like an aircraft taking off. *GR*-constructed physical equations that hold for any frame, even accelerating ones. . .It is a revolution in the way that we need to view the relationship of space-time and matter.”

Inertial frames are frames that are moving at a constant velocity with respect to each other, like a train moving at constant velocity. If no windows, someone in the train can't tell if the train is moving. There is no experiment one could do *inside the train* to show the train is moving.

Someone in a rocket ship going the speed of light away from a clock on Earth at noon looking back will always see noon on the Earth clock, as he is going as fast as the image on the clock he sees that says noon. The space ship traveler's watch will continue to keep moving as usual.

Similarly, someone on the ground will see noon on a clock on a spaceship moving away at the speed of light even if his watch says 2 pm. If the spaceship abruptly reverses and returns to Earth at the speed of light, the clock on the spacecraft and the clock on Earth will then agree.

1915 **Einstein** presented his *GR* field equations on November 25, 1915 to the Prussian Academy.

Five days earlier, **David Hilbert**, a great German mathematician, gave a talk containing the same equation to the Royal Society of Sciences in Gottingen. Such coincidence is seen as evidence that scientific truths, even if developed independently, will be the same. .

GR equations described either a contracting or an expanding universe. **Einstein**, like everyone, thought the universe was static. So he added a *cosmological term*, a fudge factor, to his calculations to make his calculations consistent with a static universe and tried to understand and quantify this *cosmological term*. **Einstein** also tried to combine the two field-producing causes, magnets and electric current) into one theory

Noether Theorem

Physics: **Emmy Noether** (1882-1935), German, saw a link between conservation laws (like conservation of energy) and the symmetries of nature. Then, understanding of this link is how physicists describe the world. She also solved a flaw in **Einstein’s** relativity by showing energy may not be conserved locally but is conserved on a larger scale.

God gave me my money

Social Darwinism: **John D Rockefeller**: (1839-1937), America’s first billionaire, was quoted as saying, “The growth of large business is merely the survival of the fittest, God gave me my money.”

Redshift, Blueshift.

Astronomy, nebulae (**Messier’s** 1774 cloudy objects): **Vesto Slipher** (ref.1912) had said that most nebulae appeared redder (ref. 1848-**Fizeau**) than distinct stars in our *Milky Way*, which indicated such nebulae were going away from Earth, but that the *nebula* appearing to be in the *Andromeda constellation* appeared bluer, thus was *approaching* Earth. (**al-Sufi** in 964 had seen it as a *cloudy object* that *appeared* to be within the *Andromeda Constellation* of our *Milky Way*. (See 1924-**Hubble**)

Two Andromedas So, there are two *Andromedas*, the constellation Andromeda, an identifiable group of distinct stars in our *Milky Way* galaxy, and the Andromeda galaxy, cloudy objects which *appear* to be in the constellation *Andromeda* in our *Milky Way* but really far beyond it.

1916 **Slipher** saw the light from some cloudy nebulae in the heavens was much redder than light from distinct sources of light, namely stars considered to be in our *Milky Way Galaxy*.

A clue that the universe is expanding Physics, astronomy, red shift: **Slipher** did not realize it, but it meant that such nebulae were beyond our *Milky Way* and going away from Earth, some even going 2M mph, while light from the distinct stars in our *Milky Way* stayed the same color, indicating that they stayed a distance from Earth. Our *Milky Way* Galaxy like all galaxies is held together by an equilibrium between the centrifugal force of its spinning solar systems and gravity.

1916 **Slipher** knew **Kant** had speculated that there were stars beyond the *Milky Way*. So he wrote, "It has long been suggested that nebulae are stellar systems seen at great distances. This theory, it seems to me gains great favor." As noted, except for **Kant** and maybe a few others, astronomers then assumed that the *Milky Way* was the total universe, not expanding or contracting. **Slipher** measured the redness of 13 nebulae and the blueness of *Andromeda* and another indicating those two were approaching Earth). The redness / blueness of nebulae are called the redshift and the blueshift.

British generals wasted 19,240 lives in one day. The Great War Political Theory, war, racism:: American professor **Vernon Kellogg**, living in Germany, wrote that many of the German General staff, often university professors, justified the German attitude of cultural superiority based on the ideas of *Social Darwinism*.

On July 1, 1916, the first day of the Battle of the Somme, 19,240 British soldiers died , 40,000 wounded. **HG Wells**: "British generals wasted more lives than died in the whole French Revolution from start to finish."(In 25 years the war became known as World War One).

Shaw Quotes Philosophy: **George Bernard Shaw** (1856-1950), Irish, "No sooner had **Jesus** knocked over the dragon of superstition than **Paul** boldly set it up again in the name of **Jesus**. **Jesus** was talking the most penetrating good sense when he preached Communism." "The reality behind the popular belief in God is a creative spirit in ourselves that **Paul** called the Heavenly Father and we call *Evolution*, *Elan Vital*, *Life Force* and other names." "The essential factor in the process of life is precisely the tremendous inner power to shape and create new forms. which merely uses, exploits the environment."

Do not do to others. Patriotism is idiocy. The state robs the poor. Philosophy: **Shaw** said, "Do not do unto others as you would have them do unto you. They may have different tastes." (**Kant's** golden rule, his categorical imperative of 1781, was worded to avoid **Shaw's** problem.) **Shaw**: My way of joking is to tell the truth." "Patriotism is a pernicious, psychopathic form of idiocy." "The state at present is simply a huge machine for robbing and slave-driving the poor by brute force.. the rich may pay the piper and call the tune. Naturally that they use their power to steal more money to continue to pay the piper; thus all society becomes one huge conspiracy."

1916 "The power of accurate observation is frequently called cynicism by those who don't have it."

Shaw Quotes "A man who calls himself 100% American and is proud of it, is generally 150% an idiot politically." "God is on the side of the biggest battalions." This phrase or a variant has been used by many persons. But, its common sense truth works only when wars are fought with battalions, as most wars have been.

Anti-colonial wars, however, are based on ideology, as India, China, & Viet-Nam showed. North Viet-Nam beat the French and then the US with no airplanes but its ideology of independence and \$5 bicycles.

1916 **Shaw Quotes: A liar's curse: he can't believe anyone else** "All great truths begin as blasphemies. An Englishman thinks he is moral when he is merely uncomfortable. . . When a stupid man does something he is ashamed of, he always declares that it is his duty." (**John Stuart Mill** had said this in 1765) **Shaw**: "That a believer is happier than a skeptic is no more to the point than that a drunken man is happier than a sober one. I often quote myself. It adds spice to the conversation. The liar's punishment is. . . not that he is not believed, but that he cannot believe any one else. Liberty means responsibility; that is why most men dread it."

Measuring stars distance Physics, astronomy: **Henrietta Leavitt** (1868-1921), was first a human "computer", then astronomer at Harvard, devised a way to measure the distance to a star far away. In 1908, she had noted a

from Earth ‘correlation between the brightness of a certain class of variable star, called the period-luminosity relationship, a *Cepheid variable*, found in spiral galaxies, and the period of the variation.

The brightness of a star depended in its distance to Earth (not its size). So by noting the period of a variable star, one can judge its absolute brightness, and its apparent brightness tells its distance to Earth. **Hubble** in 1924 used this method to calculate stars’ distances from Earth.

1916 **Chemistry, regularizing the elements:** The chemical properties of the elements had been found to repeat themselves each eight multiple of protons in their atoms. **Gilbert Lewis** (1878-1946) then professor of chemistry at UC Berkeley (later dean) became known for his discovery of what in 1919 came to be called the *covalent* bond and his concept of electron pairs.

“Shells” of electrons’ orbits

He said that combinations between atoms were due to the number of electrons in the outermost orbital shell of electrons, i.e., whether and how an atom can combine with other element by the sharing of electrons, to be called the *covalent* bond. (See Atom in the Index)

1916 **Lewis** said that If an atom’s outermost shell of electrons has eight electrons (the limit for electrons’ orbital shells), it is stable and does not combine with other elements. It is “inert.” Remember, the “shells” here referred to are not physical “shells,” just specific defined distances from the tiny nucleus.

Black Holes **Astronomy:** **Karl Schwarzschild** (1873-1916), German, resurrected **John Michell’s** 1783 idea that there were bodies in space whose gravity is so strong (even though gravity is the weakest force), that within a certain distance, an “*event horizon*,” no mass, including light, could escape its gravity pull. They are detected solely by their gravitational effect on nearby stars. (see 1963)

Need for a Recovery in Philosophy **Philosophy:** **John Dewey** (1859-1952) American social reformer, a humanist, philosopher, psychologist, a thinker for the heartland, an important philosopher of his time, a champion of collective social power, was important in pragmatism. In his *The Need for a Recovery in Philosophy*, he said that philosophers should forget “pseudo-problems” and deal with the “problems of men.” He rejected learning by rote in favor of leaning by doing.

He argued and acted for a wide range of progressive social reforms over c65 years.

Dewey Quotes **Philosophy:** “Education is not preparation for life; it is life itself.” “Democracy reaches its most successful expression in voluntary associations among individuals. . . rather than government action. Anyone who has begun to think, places some part of the world in jeopardy.” “Every great advance in science has issued from a new audacity of imagination.”

1916 **Islam:** The first 5 (of 15) chapters of *Origin of Species* was translated into Arabic. Islam denies evolution.

Philosophy: **Bertrand Russell**, *The Philosophy of Logical Atomism*, “The point of philosophy is to start with something so simple as not to seem worth stating, and to end with something so paradoxical that no one will believe it.”

The Code of Canon law 1917 **Religion:** Canon law dictates all relationships and all activities within the Catholic Church. Before 1917, Canon law was like common law before **Blackstone**, scattered among many authors, decrees, rules, regulations, disorganized. **Pius 10** wanted it made current and organized with the pope having more central control of all actions and statements of the church, including the sole power to appoint bishops.

The code was to applied universally without local discretion. It described lines of authority, set penalties and rules. Priests couldn’t publish books without their bishops’ OK. It transformed the power of the pope. It transferred authority from local dioceses to the pope. Pope **Pius 12**, then priest **Eugenio Giovanni Pacelli** (1876-1958) had a major part in writing it

c.1917 **Psychology:** **Joseph Conrad /Korzeniowski** (1857-1924) Polish-British novelist, “Do not talk to me of **Archimedes’s** lever. . . Give me the right word and the right accent and I will move the world.”

The State and Revolution **Political Theory, communism:** **Vladimir Illich Ulyavov Lenin** (1870-1924), was born to an upper middle class family, He became a revolutionary socialist in 1887. He spent his life in revolutionary activities. After the 1917 February Revolution ousted the Tsar and established a Provisional Government, with the Bolsheviks (majority) he became the first head of government of Soviet Russia and of the Soviet Union (1917-’24). His book, *The State and Revolution* formulated the first corpus

of Marxian Political Theory built on Marx's economic ideas. Marxism split into communism and Social Democrats. The Trans-Siberian railway was completed to Vladivostok.

- 1917 **America First.** The Great War: (1914-1918) (**Woodrow Wilson** had used the phrase *America First* in 1916 to remind voters he had kept the US out of the war) but shortly, in 1917, joined England with its colonies, and Russia and France to defeat Germany and its allies. War fever overtook America, Civil liberties were extensively violated, labor unions crushed, conscientious objectors tortured, "espionage" prosecuted, all as later documented by **Adam Hochschild's** *American Midnight*.
As a patriotic slogan, "*America First*" was then used by the Ku Klux Klan, then by **Hearst** newspapers, then **Warren Harding**. In 1940 by the *America First Committee* (an isolationist anti-Semitic pro-fascist organization, and by politicians, **Pat Buchanan**, and finally **Donald Trump**.
- 1918 Political Theory, socialism: **Eugene Debs** (ref. 1914). "The class which has the power to rob on a large scale has also the power to control the government and legalize their robbery." "While there is a lower class, I am in it; while there is a criminal element, I am of it; While there is a soul in prison, I am not free."
- The Porvenir Massacre** Racism: In the small border town of Porvenir, Eight Texas Rangers and 12 US Army soldiers massacred 15 Mexican-American farmers, some US citizens. The Rangers' leader and the Army lied to excuse their men. The remaining 140 residents fled. The soldiers then burned Porvenir to the ground.
- Upton Sinclair, muckraker** Social Criticism: **Upton Sinclair's** (ref. 1906) *King Coal*, described horrible labor conditions in coal mines. *The Profits of Religion* (1917) exposed fraudulent preachers. "I can see how sincere, how passionately proletarian a religious prophet may be – to be founder of an organization of fools, conducted by knaves, for the benefit of wolves. That fate befell **Gautama** and **Jesus**; it befell **Ignatius Loyola**, **Francis Assisi**, **John Calvin**, and **John Wesley** (1749- Methodism)". His 1919 book, *The Brass Check*, exposed corruption in the news industry, especially in the Associated Press.
- 1918 Great War: Germany and its axis were crushed. Around Armistice day, **Paul von Hindenberg**, chief German general told American reporters that, "The American infantry in the Argonne won the war." American general **Pershing**, stopped this statement from being published.
A few years later **Hitler** falsely told the German *volk* that Germany lost the war because it was stabbed in the back by Jews, socialists, communists, "November criminals"..The stabbed in the back myth and blaming Jews for Germany's condition It was a major part of Hitler's political career. Total war deaths were 21 million, including 115, 000 American soldiers. The war was a senseless slaughter.
- 1918 Political Theory, communism: **Vladimir Ilich Lenin** (1870-1924) *The State and Revolution*, the first writing of his Marxian Political Theory. The state is only a machine for one class to oppress another.
In 1922, He credited two Americans as having influenced his philosophy of Marxism, **Daniel DeLeon** (ref. 1891) a Marxist, and **R F Pettigrew**, a senator of South Dakota. **Pettigrew** in 1920 published *The Course of Empire*, a devastating muckraking report of corruption
- After the Great War, Europe was in ruin.** War consequences: European cities were in ruins. Millions had no jobs as there were no jobs to be had. A flu epidemic raged. In the US, right-wing political forces promoted an anti-communist "Red Scare", with the Espionage (1917) and Sedition (1918) Acts sharply restricting basic American rights, based on a claimed Communist threat to American democracy.
"Red scare" American historian **Commager** (ref. 1947, '50) called the Red Scare "one of the shabbiest chapters in the history of American democracy."
- 1919 Economics: **John Maynard Keynes** (1883-1946), Cambridge, wrote *The Economic Consequences of the Peace* scathingly criticizing the reparations imposed on Germany and her allies as overly harsh and impossible to execute. Reducing Germany to servitude for a generation was abhorrent.
- Der Untergang des Abendlandes.** Political Theory, the nature of states: **Oswald Spengler's**, *The Decline of the West*, said, "Cultures are like living things. They are born, mature, decline and die." This is the cyclical theory of cultures. **Toynbee** repudiated it.(ref. AD 337, pp. 408, 495)
Cyclical theory of cultures History does not repeat itself. They did agree that the appropriate units of study of mankind are not races or languages or religions but their major literate cultures. "The fate of a nation depends not on laws or constitutions, ideals, and programs; it depends foremost

on the capabilities of the ruling minority. Marxism is the capitalism of the working class.”
In the end, **Toynbee** became a theologian and saw “God revealing Himself in action.”

- 1919 **Physics: Arthur Eddington** (ref. 1912, ‘14-15) introduced *General Relativity* to English speaking scientists. He wrote a number of articles that announced and explained **Einstein’s** theory of general relativity. He called it “a revolution of thought, profoundly affecting astronomy, physics, and philosophy, setting them on a new path from which there could be no turning back.”
“We used to think 1 and 1 equal 2. We are learning that we need to know more about “and”.

Newton vs. Einstein on gravity’s effect on light rays **Physics, astronomy: Einstein** agreed with **Newton** that light was attracted by gravity, but his equations produced a *slightly* greater attraction than **Newton’s** This was called the “**Einstein** shift.” No experiment had verified **Einstein’s** theory.

Astronomer **Erwin Freundlich**, an associate of **Einstein**, said one *could* measure how much light rays were bent by gravity by measuring how much light from *The Hades*, a bright group of stars far beyond the Sun, would bend by the gravitational pull of the Sun when light from *The Hades* passed the Sun on its way to Earth. This could be observed only during a total eclipse of the Sun.

Measuring light from the Hades bending made Einstein famous 1919 To make such measurement, **Eddington** led a *Royal Society* expedition to Principe, Africa, close to the equator where an eclipse of the Sun could be seen. **Einstein’s** measurements there of light coming from *the Hades*, when passing the Sun, bent slightly more than **Newton’s** calculations, as **Einstein** had predicted. This verified **Einstein’s** calculations based on non-Euclidian space-time, not **Newton’s**. This made **Einstein** famous.

The difference between using **Einstein’s** equations regarding gravity are real but so slight that **Newton’s** far simpler equations are used for all problems dealing with velocities up to 99+% of the speed of electromagnetic waves/ light, i. e, everything but electromagnetic waves.

How elements combine

Chemistry: Gilbert Lewis in 1916 had said that If an atom’s outermost shell (orbital area) of electrons has eight electrons, it is stable and does not combine with other elements.

Irving Langmuir (1881-1957), American physicist, said that the “shell” closest to the atom’s nucleus can contain only two electrons and is the lowest energy shell. The other shells can hold up to eight electrons each and are higher energy level shells. Atoms whose outer shell contains 1-7 electrons can combine with other elements whose outer shell has 1-7 electrons to total 8 electrons in the outer shell of the combined atoms (molecules). **Langmuir** called such atoms bondings *covalent* bonding. (**Linus Pauling** in 1939 wrote the definitive treatise on chemical bonding.)

Law: Oliver Wendell Holmes (ref.1895) Supreme Court Justice, “petitioner may have a constitutional right to talk politics, but he has no constitutional right to be a policeman.” (more **Holmes** 1929)

- 1919 **Science: Planck**, “A new scientific truth does not triumph by convincing its opponents making them see the light, but rather because its opponents die, and a new generation grows up that is familiar with it.”

Fascism Definition

Political Theory, fascism: “a form of radical authoritarian ultra-nationalism, characterized by dictatorial power, forcible suppression of opposition and strong regimentation of society and of the economy.” **Gabrielle d’Annunzio**, an Italian adventurer, with a ragtag proto-fascist organization, with troops in black shirts, occupied the city of Fiume. Facing defeat, he asked his friend, **Benito Mussolini**, an atheist, anti-Catholic, socialist, and editor of the magazine, *Popolo d’Italia* for help.

Mussolini raised money ostensibly for **d’Annunzio** but then used it to finance his own black-shirt troops under the name “Fascism.” He formally established the National Fascist Party in November, 1921. He said that nationalism was the prime mover in history and it was the job of the state to protect the nation from harm; nations being a living organic whole. He began to cleanse Italy from all cultural assets that were non-Italian. (more fascism at 1922, ‘25, 29, ‘31-41, ‘46)

Aviation: John Alcock and Whitten Brown, Brits, flew first transatlantic flight, Newfoundland to Ireland.

- 1919 **Political Theory, socialism: John Reed** (1887-1920), American socialist and journalist, “In the last analysis, the property-owning class is loyal only to its own property. . . [It] will never readily compromise with the working class. The masses of the workers are not only capable of great dreams, but have in them the power to make dreams come true.” He went to Russia, died there in 1920.

1920-38 *Galaxies Quantum Dirac Russell Mencken Hubble Fascism*

**Philosophy
negates
religion**

Philosophy: Benedetto Croce (1866-1952), Italian philosopher and Minister of Education, spoke against fascism. Said, "Philosophy takes from religion all reason for existing. . . . as the science of the spirit [philosophy], looks upon religion as a phenomenon, a transitory historical fact, a psychic condition that can be surpassed." "Woe to the man who shines brilliant light in a place where people want to keep in darkness and shadow."

**History is
progress,
not crimes.**

Croce named nine epochs of man.

1. Pre-historic persons who originated a belief in supernatural forces.
2. arts and sciences advanced and governments formed.
3. Farming and the alphabet developed.
4. the Greeks who guided future thinking.
5. Advances in mathematics and medicine.
6. and 7. the Middle Ages, a disastrous period of religious intolerance.
8. Printing, the discovery of America, and the scientific revolution, and
9. the Age of Reason.

1920 Astronomy: Heber Curtis (Lick Observatory, San Jose, Ca.) speculated that *nebulae* were distinct separate *island universes* (Kant, Slipher) beyond the *Milky Way*, not gas clouds *within* the *Milky Way* as they appeared and as Harlow Shapley (Mt Wilson Observatory) argued in a "great debate" in Washington, DC. (In 1924, Hubble at Mt. Wilson proved nebulae were far beyond the *Milky Way*.)

1920 **Wm. Strunk** wrote *Elements of Style*, Omit needless words. Use active voice. Be specific. Don't tell, show.

**Darrow
Quotes**

1920 Law, Justice: Clarence Darrow (ref 1902), "The constitution is a delusion and a snare if the weakest and humblest man in the land cannot be defended in his right to speak and his right to think as much as the strongest in the land." "The origin of the absurd idea of immortal life is easy to discover; it is kept alive by hope and fear, by childish faith, and by cowardice."
In America, women won the right to vote. (In Poland and Ireland 1918, in Germany, Denmark, and Holland 1919. Spain 1933. France 1945. Italy 1946. Greece 1952. Switzerland 1971).

**Promoting
anti-
Semitism
in America**

1920 Religion, Christian anti-Semitism: Anti-Semitism was a dark current in European and then American culture. Protestantism's founder, **Martin Luther**, was a virulent anti-Semite. (*The Jews and Their Lies*. 1543). Anti- Semitism's principal document was a false 1903 Russian forgery, *The Protocols of the Elders of Zion*. America's most influential anti-Semite was automaker **Henry Ford**.

To promote his view, he bought a small weekly, the *Dearborn Independent*. From 1919 to 1927 he published 92 front page articles titled, "*The International Jew*," falsely blaming Jews for virtually every ill in the world. He had his large network of **Ford** dealers nationwide buy multiple copies and required them to promote his hate to their customers.

Due to **Ford**, the paper had a national circulation of 900,000 by 1926. (the N Y Times had 780,000)

Muckraker: Sinclair Lewis' s Main Street, ridiculed small-minded unimaginative, complacent small towns. In 1922, his *Babbitt* was a common middle class American businessman, of complacent mediocrity, bullies his wife, ogles his manicurist, a phony Christian, proud of his car and how he can make money.

**Race killing
Ocoee
Massacre**

Racism in Florida: To prevent black citizens from voting, a white mob attacked and killed 30–35 Blacks in Ocoee Florida. The White mob burnt almost all Black-owned buildings and homes to the ground. All but two Blacks were later killed or driven out of town leaving behind their homes and possessions.

**1921
Race
Killing**

Racism in Tulsa: According to a 2025 Department of Justice report, "On May 31, 1921, as many as 10,000 white Tulsans destroyed the richest Black community in the U S, Greenwood, Oklahoma . . .

The attack, which lasted into the afternoon of June 1, was so systematic and coordinated that it exceeded mere mob violence. White rioters, many deputized and armed by city officials, with aircraft, murdered hundreds of Black residents. Mobs totally destroyed over 35 square blocks

Whites rampaged through the Black neighborhood killing Blacks and burning and looting stores, hotels, theaters, schools, restaurants, a cultural center, a bank, and many homes and left survivors without resources or recourse. Over 800 were hospitalized. Whites kept around 6,000 Black residents prisoner, many for several days. 10,000 Blacks were left homeless.

100-300 Blacks were killed. In the aftermath, authorities failed to offer meaningful help, and efforts to seek justice through the courts foundered. A quickie federal report said the riot was not the result of "racial feeling," and implied that Black men were responsible.

It concluded that the Whites had not violated any federal laws. It was one of "the single worst examples of White racial killing in American history, whitewashed by a quickie federal report. The *Tulsa Tribune* deleted its story of the massacre. Police and militia reports disappeared..

Adolf Hitler
The growth of fascism

Political theory, fascism, **Adolf Hitler** (1889-1945): After the Great War, Germany, once prosperous, was in dire economic shape. It was humiliated by losing and having to pay reparations by the *Versailles Treaty*. The *volk* had little hope. Germany saw a spiritual revival outside the traditional churches. One such group was the *Volksisch Movement*, an ethnic nationalist anti-Semitic movement active from the late 1800s (until 1945).

Another such group was the National Socialist German Workers Party, based almost exclusively on the idea of Aryan racial supremacy that had been preached by **Fichte** 7(1807), **Hegel** (1821), **von Ranke** (1833), and **Nietzsche** (1882). **Hitler** became its leader/*furher*.

Building on the Aryan theme, **Hitler** made anti-Semitism the central theme of his political program. From day one of his political career he said he would restore German dignity and pride and make Germany a great nation again. (Next **Hitler** 1924)

1921 Nationalism Political Theory: **Einstein** said, "Nationalism is an infantile disease. It is the measles of mankind." He won the **Nobel** prize not for relativity but for his 1905 work on the photoelectric effect.

1921 Chemistry: Rutherford (ref.1899, 1902, '06, '11, '13) suggested that there should be another particle in an atom's nucleus to keep the protons from flying apart, perhaps a proton and an electron bound together. (His idea was proven right in 1932 when his colleague **James Chadwick** found neutrons.).

1921 Law, justice: Louis Brandeis (1856-1941) (ref. 507 BC) Supreme Court Justice, "Few laws are of universal application. It is the nature of our law that it has dealt with man not in general, but with him in relationships. Nearly all legislation involves a weighing of public needs as against private desires; and likewise a weighing of relative social values." (More **Brandeis** 1941 and pp. 455, 466)

Jailed for saying something outrageous

Law. England, blasphemy: John Gott was convicted and jailed several times for blasphemy, i.e., printing pamphlets ridiculing **Jesus**, the last in 1921. He was jailed for nine months at hard labor.

The Lord Chief Justice said, "It does not require a [religious] person to be outraged by [his] description of Jesus." Jail broke **Gott**. He died. **John Locke** had said that government had no business in someone's opinions, except apparently, when they *outrage* Anglicans. In America, *The Bill of Rights* protects the right to outrage, offend, and ridicule. (See 1954-Philosophy).

1922 It's an illusion that Natural laws explain natural events

Philosophy: **Ludwig Wittgenstein** (1889-1951) Viennese, Catholic, "godfather of ordinary language philosophy" was the most important philosopher in the Anglo-American world. His *Ph.D thesis* at Cambridge was *Tractatus Logico Philosophicus./Logical-Philosophical Treatise*. He said most philosophical problems are non-issues due to linguistic misunderstandings.

"Philosophy is not a theory but an activity." "The object of philosophy is the logical clarification of thought."(Socrates) "The world is the totality of facts (true statements *about* things), not *of* things." And, "at the basis of the whole modern view of the world lies the illusion that the so-called laws of nature are the explanations of natural phenomena. (For scientists it's no illusion. It's their life.)

Wittgenstein Logical positivism

"Language constructs our sense of the world and our experiences. Traditional philosophical problems like "truth" or "being" are just confusions arising from jargon and misguided attempts to discover the "reality" it "represents." "The limits of my language mean the limits of my world."

Like **Hume**, logical positivists believed that what is not self-evident (**Hume's** type 1 statement), nor proved by experiment (**Hume's** type 2 contingency statements), is nonsense. A statement is meaningful only if some finite procedure fully determines its truth (**Hume**).

"A philosophical work consists essentially of [statements that purport to clarify something]. "The result of philosophy is not a number of 'philosophical propositions, but to make propositions clear.

Wittgenstein and **Russell** turned philosophy into the study of logic and language, analytic philosophy, where it governs today. Analytic philosophy is the philosophical approach following from **Locke** and **Hume's** empiricism which emphasizes logic, attention to language, and simplicity of argument, and seeks to clarify concepts, theories, ideas, and methods."

1922 Wittgenstein Quotes
If you can, speak clearly.

For **Wittgenstein** and logical positivists, activities in a person's life can have meaning, but a meaning of life itself, apart from those things, can't be discerned. "Why should it be possible to believe anything if one can't be certain?" [Actually, scientists believe that their beliefs are subject to better knowledge] "A doubt that doubted everything would not be a doubt."

"What can be said at all can be said clearly; and about that of which one cannot speak, one must be silent." Ordinary language is the proper subject of philosophy. He said there was

a fundamental unity to the world; mind and matter were different aspects of one reality.

The real question of life after death isn't whether it exists, but if it does, what problem it really solves." "We feel that even if all possible scientific questions are answered, the problems of life have still not been touched at all. . . I don't know why we are here but I'm pretty sure it isn't to enjoy ourselves." He said that what words mean is not what they refer to but how they are used.

Universe expands **Alexander Friedmann**, Russian astronomer, in *Zeitschrift fur Physik*, posited that the universe could be expanding. Astronomers, including **Einstein**, uniformly thought the universe was stable,

1922 **Astronomy: Carl Wilhelm Wirtz** (1876-1939), German, said that the redshifts of distant galaxies were redder than closer ones, which he said meant they were receding faster from Earth.

In 1924, more precise results confirmed a greater speed the farther from Earth and also confirmed a "de Sitter" universe, where the redder redshift was seen caused by an increased time dilation in distant parts of the universe. (See 1929-**Hubble**) (Time dilation is the difference in the elapsed time as measured by two clocks, usually due to a relative velocity between them.)

anti-Semitism Catholic anti-Semitism. The Vatican's primary publication, *La Civiltà Cattolica*, printed, "The world is sick. . . Everywhere peoples are in the grip of inexplicable convulsions. Who is responsible? The Synagogue."

1922 **Quantum theory** **Physics: Max Planck** (ref.1900,'05, '07,'14,'19) said in *The Universe in the Light of Modern Physics*, "We have no right to assume that any physical laws exist, or if they have existed up to now, that they will continue to exist in a similar manner." [So, there might *not* be order in nature?]

1922 **Fascism** Political Theory, fascism: Benito Mussolini (1883-1945), (ref. 1919), capitalized on the widespread discontent of destitute Italians. He led a movement he called fascism. He promised the Italian people that he would make Italy recreate the glories of the Roman Empire. He became Prime Minister. Lord, **Rothermere**, owner of the largest newspaper in England, the Daily Mail, expressed his "profound admiration" for **Mussolini**, said, "He saved the whole Western world,"

1923 **Lie continually** Moulding public opinion: Edward Bernays, "father of modern Public Relations," nephew of **Freud**, wrote *Crystallizing Public Opinion*, used Freud's ideas on the psychology behind manipulating masses to mould public opinion. Said, Don't use facts or logic. Create a mood. Repeat your message.

1923 **Henry Luce, America's powerful press lord, admired Mussolini** Mussolini got rid of political opposition through his secret police and by outlawing labor strikes. He consolidated power through a series of laws that changed Italy into a one-party dictatorship.

Mussolini said regarding fascism, "The truth apparent to everyone whose eyes are not blinded by dogmatism, is that perhaps men are weary of liberty."

In America, press lord **Henry Luce** (1898-1967), founder / owner / publisher of *Time magazine*, America's largest news magazine, profusely praised Mussolini. **Luce** put him on the cover of *Time* five times, in 1923 just to celebrate **Mussolini's** birthday.) Speaking before business groups he said that America's corporate and banking elites were more powerful and important than the US government.

The Indus River Civilization (c2500-1500 BC) was discovered. **Pius 11** (1857-1939) became pope. .

1923 Capitalism: Calvin Coolidge (1872-1933, US Pres.1923-29), "Civilization and profits go hand in hand."

1923 **Philosophy: George Bernard Shaw** (ref. 1916) "Our middle classes, who are comfortable and irresponsible at other people's expense. . . are neither ashamed nor even conscious if it."

1923 **Physics, the atom: Bohr's and Langmuir's orbiting electrons model** of atoms was modified by waves with modes of resonance, probabilities and extra dimensions. But, atoms still combine by electrons combining.

1923-24 **Our Milky Way galaxy is not the only galaxy** Astronomy: Our then known universe, the Milky Way galaxy, (with the constellation Andromeda), was considered to be c.100,000 light years across. Edwin Hubble (1889-1953), an astronomer at Mt. Wilson observatory in LA, with a new 100 inch diameter lens telescope (could see a candle ten miles away), published *Cepheids in Spiral Nebulae*. He had observed that light from the nebula Andromeda was c.900,000 light years from Earth, so it had to be far outside the Milky Way.

Hubble and his assistant **Milton Humanson** used the *nebulae list*, that is, **Messier's** 1774 list of cloudy blobs of light in the heavens, to locate targets to observe for their redness. In 1924, they soon found 46 *nebulae*, **Kant's** "island universes" (now called galaxies) far beyond our *Milky Way* galaxy. **Hubble** thus confirmed Kant's 1751 and Slipher's 1916 and Curtis's 1920 ideas of stars beyond the Milky Way, i.e., other galaxies besides our Milky Way. (Now billions of galaxies have been found

1924 Paleontology: Raymond Dart (1893-1988), Australian, found the first *Hominim* fossils in

northern Union of South Africa, named the fossils *Australopithecines* (Southern Ape.).

All matter acts like particles and waves. Physics: **Louis-Victor, Duc de Broglie** (1892-1987), French physicist. His 1924 Ph.D thesis postulated the wave nature of electrons and suggested that all matter has wave properties. (Now called the **de Broglie** hypothesis, an example of wave-particle duality, and forms a central part of the theory of quantum mechanics.) This argued that matter (including light) should logically act both as particles and as waves, dual aspects of the same phenomenon, matter.

Wave mechanics **De Broglie's** reasoning was, "Any moving particle or object has an associated wave." If one accepts that *photons* (particles of energy from the visible light portion of the electromagnetic spectrum) move in waves, and that light moves both as a wave and as particles, then all parts of the electromagnetic spectrum should also move in waves and as particles" **Einstein** agreed. The energy of a photon is proportional to the frequency of its radiation. This created a new field in physics, *wave mechanics*. It also explained **Einstein's** 1905 energy-frequency equivalence.

Marriage traps women 1924 Psychology, feminism: **Emma Goldman** (1869-1940), Russian American feminist, "The sole legitimate purpose of society is to serve the needs and advance the aspirations of the individual." But, "The institution of marriage makes a parasite of woman, an absolute dependent. It incapacitates her for life's struggles, annihilates her social consciousness, paralyzes her imagination, and then imposes its gracious protection, which is in reality a snare, a travesty on human character."

Christian missionaries supported the ruling classes Political Theory, colonialism, religion: **Mahatma Gandhi** (ref. 1896), "The influence of Christianity has been to quicken Hinduism to life. The cultured Hindu society has admitted its grievous sin against the untouchables. But the effect of *Christianity* upon India in general must be judged by the life lived in our midst, by the average Christian and its effect upon us. . . It has been disastrous." "The Christian missionaries as a body, with honourable exceptions, have actively supported a system (the Caste System) which has impoverished, enervated, and demoralized a people considered to be among the gentlest and most civilized on earth."

1924 Ethnic discrimination: US immigration laws were changed to increase Northern European immigrants and decrease all other areas.(ref. 1914-19-Red Scare, 1889-*Chinese Exclusion Acts*) The US has mistreated groups of immigrants, Chinese, Irish, Jews, Italians, Mexicans, Japanese

Hitler's putsch failed. In jail, he wrote Mein Kampf. Political Theory, fascism: In 1923, **Adolf Hitler** with his Nazi group in Munich attempted a *putsch* of the Bavarian government. He told a huge beer hall crowd that his movement would "save the German people". He had thugs trash a newspaper that had criticized him. His *putsch* failed. He was sentenced to a year. He served 8 months. In jail, he wrote *Mein Kampf / My Struggle*, his manifesto for fascism in Germany. He approvingly quoted **Henry Luce** and **Martin Luther**. Its basic themes were Aryan racial supremacy and **Martin Luther's anti-Semitism**. **Luther** was also a fervent authoritarian (*Against the Robbing and Murdering Peasants*).

1925 Political lies, propaganda, must be directed exclusively to the uneducated Fascism: Now out of jail, **Hitler** published *Mein Kampf* and rebuilt his political movement, promoting German nationalism and Aryan racial supremacy. Propaganda and terror were his two key weapons in controlling the *volk*. Right-wing ultra nationalistic military officers recognized his skill as a demagogue and supported him and helped him to buy his first newspaper, the *Volkischer Beobachter*. *Mein Kampf* specifically said that political speech must be addressed always and exclusively to the less intelligent masses, not the intelligentsia, In his office, he had a large portrait of **Henry Ford** and bound volumes of **Ford's** anti-Semitic newspaper articles. (**Ford** truck factories in Germany used slave labor when under Nazi control.) **Hitler** constantly repeated his simple lies about Jews and appealed to German patriotism. Lutherans were Germany's largest Protestant sect. He used **Martin Luther's** ugly criticism of Jews (ref. 1543) in his speeches. He said America was the only contemporary example of a country with racist laws. Nazi lawyers used US Southern states' anti-Negro "Jim Crow" laws as models.

1925 Propaganda must be simple and repeated for the stupidest people Propaganda: *Mein Kampf* said. "All propaganda must be so popular and on an intellectual level that even the most stupid of those toward whom it is directed will understand it." He was referring to the German *volk*. He deleted this insult of the *volk* from further editions. *Mein Kampf* said that propaganda must be directed exclusively to the uneducated masses, not to the educated. It also said "The primitive simplicity of [the *volk*] renders them more easily prey to a big lie than a small one." "All advertising, in business or politics, will succeed by clever and repeated application. People can be made to see paradise as Hell. One fundamental principle is that propaganda must confine itself to a few points and repeat them over and over."

Rich industrialists helped **Hitler** rebuild his party and helped him buy newspapers and magazines to spread his philosophy. They promoted him principally as he was an enemy of

communism and trade unions. Playing to Germany's Christian anti-Semitism, **Hitler** repeated his one *Big Lie*, that Germany lost the war because Jews had betrayed the noble German *volk*. The rise of Naziism was based on **Hitler's Big Lie**.

Hitler gained power

He said that mankind has three groups, culture creators (Aryan, Nordic), culture bearers (like the Japanese), and culture destroyers (Jews, Negroes). **Hitler** melded powerful myths, white superiority and anti-Semitism with patriotism. He praised the "simple and honest" values of the German peasantry and denigrated intellectuals. The more he repeated his anti-Semitism, the more people believed him.

Jesus the capitalist

He gradually gained followers. He gave Germans someone to hate and blame for their condition. (More **Hitler** 1933). In America, **Bruce Barton**, a Christian advertising executive and a former publicity agent for **Coolidge** and **Hoover**, published a book inventing **Jesus** as the founder of modern business, an evangelical of modern capitalism.

Mencken Quotes

1925 **Philosophy: H L Mencken** (1880-1956) *Baltimore Sun* editor and critic. "All government . . . is a conspiracy against the superior man." (1919) "Religion is fundamentally opposed to everything I venerate- courage, clear thinking, honesty, fairness, and above all, the love of truth. It has, generally speaking, been a curse on mankind. The most common of all follies is to believe passionately in the most palpably not true. It is the chief occupation of mankind."

One can't reconcile science with theology.

There is no possibility whatsoever of reconciling science and theology, at least in Christendom. "Faith is an illogical belief in the occurrence of the improbable." "The great masses of men are ignorant, dishonest, cowardly, ignoble. They know little of anything that is worth knowing, and there is not the slightest sign of a natural desire among them to increase their knowledge." "I cannot follow the best liberal thought, the doctrine that a man engaged in combat superstition should be very polite to it. This is nonsense. The way to deal with superstition is to rout it, cripple it, and make it forever infamous and ridiculous."

Christian theology opposes all rational inquiry

Mencken: "Christian theology not only opposes the scientific spirit; it opposes every other form of rational inquiry." "No one has ever lost money by underestimating the intelligence of the American people." The objection to Puritans is not that they want us to think as they do, but they want us to do as they think "The basic fact about human existence is not that it is a tragedy, but that it is a bore."

Mencken Quotes

"The essence of science is that it is always willing to abandon a given idea for a better one. The essence of theology is that it holds its truths to be eternal and unchangeable." "Moral certainty is always the sign of cultural inferiority. Change is not progress. For every complex question, there is a simple answer, and it is wrong. All men are frauds. The only difference between them is that some admit it. . . I myself deny it. Never argue with a man whose job depends on him not being convinced." "When the [Fathers of the Republic] made religion a free-for-all, they prepared the way for making it ridiculous;"

Mencken:
Patriotism is the first, last, and middle refuge of fools

"The more *uncivilized* the man, the surer he is "that he knows precisely what is right and what is wrong." "Dr. [Samuel] Johnson said patriotism is the last refuge of scoundrels. **Bierce** says it is the first. But there is something worse; it is the first, last, and middle refuge of fools.

The public demands certainties. . . But there are no certainties.

Nine times out of ten, in the arts as in life, there is no truth to be discovered; there is only error to be exposed." Religions' modest services on the ethical side are nothing to the damage. . . to clear thinking. Patriotism is the great nursery of scoundrels. Its annual output is probably greater than that of even religion. A government composed of cynics is often very tolerant and humane.

But when fanatics are on top there is no limit to oppression . . .

My guess is that over 80% of the human race goes through life without having an original thought."

Problem of Suffering /Evil negates God

Mencken, said that *The Problem of Evil/ Suffering* negated God. "The whole Christian system, like every similar system, goes to pieces upon *The Problem of Evil*. Its most adept theologians, after attempting to reconcile the [God] of their theory with the dreadful sufferings of man can only retreat behind **Chrysostom's** despairing maxim, that a 'comprehended God is no God.'"

Extinct gods

Mencken asked, "What has become of Resheph, Anath, Ashtoreth, Wotan, Moccus, Tezcatlipoca. Quetzalcoatl, Xiuhtecuhtli, Centeotl, Tlazolteotl, Mictlan, Xipe, Tzitzimittl, Tarves, Epona, Mullo, Damona, Esus, Drunemeton, Ra, Silvana, Dervones, Adsullata, Deva, Bellisima, Uxellimus, Borvo, Grannos, Mogons. Sutekh, Nergal, Nebo, Ninib?" He named 65 gods who were once widely worshiped as omnipotent.

1925 Monkey trial. William Jennings Bryan's testimony

Biology, evolution, religion, ignorance: Tennessee outlawed teaching evolution. **John Scopes**, a biology teacher, taught it. The ACLU hired **Clarence Darrow** to defend him. The judge ruled that scientific evidence of evolution was irrelevant. The Tennessee legislators didn't care if evolution was true. They knew their *Bible*. (Like **Galileo's** 1633 Church Inquisitors they didn't care if heliocentrism was true. They knew it discredited a Church argument for its God.)

H L Mencken covered the trial for the *Baltimore Sun*. When the judge barred scientific evidence

for evolution, **Mencken** advised **Darrow** to call the state's prosecutor, famous **William Jennings Bryan** as a defense witness as an expert on *the Bible*. **Bryan** could not explain simple contradictions in the *Bible*. He was so embarrassing to the prosecution that the judge struck his testimony from the record. (To be fair, no one could have reconciled the contradictions **Darrow** posed to **Bryan**.)

Nonetheless, as **Scopes** admitted to teaching evolution, he was found guilty. But **Mencken** and **Darrow** had won the battle for public opinion. Tennessee became a bigger object of ridicule.

Bryan died six days later. (**Scopes's** conviction was later voided on a technicality.)

(**Scopes** in 1965 said that the trial "marked the beginning of the decline of fundamentalism.")

Agnosticism

Darrow, "I consider it a compliment to be called an agnostic. I do not pretend to know where many ignorant men are sure - that is all that agnosticism means." To a jury in 1920, he said, "You can only protect your liberties in this land by protecting the other man's freedom.

You can only be free if I am free." (later) "The origin of the absurd idea of immortal life is easy to discover; it is kept alive by hope and fear, by childish faith, and by cowardice."

- 1925 Philosophy: **Bertrand Russell**, said, "I do not pretend to be able to prove that there is no God, or that Satan is a fiction, or the gods of Olympus or the Egyptian gods existed. No one of these hypotheses is more probable than any other, and so there is no reason to consider any of them."

Physics: **Wolfgang Pauli** showed his exclusion principle. It helped explain atomic structure statistically.

- 1926 Physics, Matrix Mechanics: **Werner Heisenberg** (1901-76), German, **Niels Bohr**, and **Pascual Jordan** developed a system called *matrix mechanics* / *quantum mechanics* which gave the observed tendencies and frequencies of spectral lines. It is the science of how sub-atomic particles move, orbit, leap, and produce light.

Matrix mechanics is a formulation of quantum mechanics, the first conceptually autonomous and logically consistent formulation of quantum mechanics. Its account of quantum supplanted **Bohr's** electron orbits by interpreting the physical properties of particles as matrices that in time. **Heisenberg** published his work.

It was equivalent to the **Erwin Schrödinger** wave formulation of quantum mechanics. In a subsequent series of papers with **Max Born** and **Pascual Jordan** during 1925, this matrix formulation of quantum mechanics was substantially elaborated using *matrix algebra*.

Heisenberg got the 1932 Nobel in Physics "for the creation of quantum mechanics."

He was the most eminent German physicist of his day and taught many physicists in the 1930s. **Heisenberg** killed Germany's development of an atom bomb in ways so subtle that his reputation as a loyal German was never questioned. In 1946 he explained that German physicists hated the idea of putting an atom bomb in the hands of **Hitler**.

JP Morgan, rescued Mussolini & fascism.

- 1926 Political Theory, fascism: **Mussolini** outlawed all opposition political parties. Before he became PM, he had been an atheist and socialist. He had criticized the Vatican. But Catholicism was Italy's religion and was near bankrupt.

Thomas Lamont, a top official of J P Morgan and Co, who described himself as "something like a missionary for Italian fascism," praised **Mussolini** as "a very outstanding chap who had done a great job in Italy." He arranged a loan of \$100 million to **Mussolini**.

With the \$100 million, **Mussolini** negotiated three agreements with Pope **Pius 11** regarding control of Vatican City and other matters. (See 1928-29- *Lateran Pact*.)

In 1927, **Mussolini** ordered the total suppression of all non-fascist publications-newspapers, magazines, all books, all -pamphlets-anything. By 1927, Mussolini had established dictatorial authority and by both legal and illegal means. He stayed popular with American fascists.

Electro-magnetic waves are probabilities

Physics: **Max Born** (1882-1970) German, argued that the electromagnetic wave corresponding to a particle was a wave of probabilities; it was a representation of the state of the particle.

Unlike a particle, a wave can be in several places at the same time. Physicists in the 1920s saw that one can't know accurately and completely how whatever particles were within atoms worked. The study of such particles required a different view of reality. He said, "I am now convinced that theoretical physics is actual philosophy."

- 1926 Astronomy: The source of stars/suns' energy was then unknown. **Eddington** (ref.1911, '14, '19), anticipated the discovery and mechanism of nuclear fusion processes in stars. He wrote *The Internal Constitution of the Stars*. **Eddington** was the first to speculate accurately that the source of sunlight was fusion of hydrogen into helium. He was knighted in 1930. (More 1931, '33)

Aviation: Roald Amundsen, Lincoln Ellsworth, and Umberto Nobile flew over the north pole. Richard Byrant and Floyd Bennet flew from Spitzbergen over the North Pole and back.

1927-28 Social criticism: Sinclair Lewis (ref 1920) published *Oil*. It described President **Warren Harding's** corruption in the oil industry in Southern California and in religious revivals. His book *Elmer Gantry* about a licentious, alcoholic, conman Evangelical preacher was the best seller. **Lewis's** 1928 book, *Boston*, based on the **Sacco-Vanzetti** case, indicted Boston's tradition of privilege. In 1930, he won a Nobel. In 1936, he wrote, *It Can't Happen Here*, a popular anti-fascist novel.

Electrons are energy waves 1927 Physics, the synthesis of matrix mechanics and quantum mechanics: Werner Heisenberg (ref. 1925) described what became known in English as the *Uncertainty Principle*, while working on the mathematical foundations of quantum mechanics. ("Uncertainty" is a mis-translation. The German word he used means "imprecision", not "uncertainty"). He newly characterized the electron as a particle where one could give its precise location but could not but say how fast it was going or in what direction. Conversely, one could fire it at a certain speed in a certain direction but could not say its starting or ending point. Its speed and position work together in a way that is limited by the quantum.

Matrix is the greatest scientific idea **Jacob Bronowski** says *Matrix mechanics* is possibly the greatest scientific idea. It deals with an electron with quantum behavior. It is a formulation of quantum mechanics that does not involve a wave function. Quantum physics is now one of the most powerful and well-tested theories of science.

1927 Physics: Erwin Schrödinger (1887-1961) (ref. 1925), Austrian, propounded the basic wave equation of quantum mechanics which interpreted the electron as an energy wave. His equation provided a way to calculate the wave function of a system and how it changes dynamically in time.

Quantum mechanics discovered for particles within atoms. He and **Heisenberg** together then discovered mathematical procedures that accurately replicated many of the observed properties of atoms, thus giving birth to quantum mechanics, a synthesis **Schrödinger's** wave mechanics and **Heisenberg's** matrix mechanics. Quantum mechanics deals only with particles within atoms. The laws of the conservation of energy and momentum stayed valid in relativity and quantum mechanics.

Quantum mechanics says a sub-atomic particle is a traveling cloud of probabilities The only way so far to observe such particle is to hit it with another particle and see what happens, so necessarily disturbing the particle being studied. Thus, for *any* sub-atomic particle to measure is to disturb.

So, one can't measure the momentum and position of a sub-atomic particle (proton) at the same time, as momentum comes from a spread out wave, while position comes from a concentrated wave, and one can't have both at once, a recognition of an inescapable duality at the heart of things. In fact, they are only a cloud of probabilities to current observing and measuring instruments. Some day, scientists may be able to measure more precisely

Complementarity is the Uncertainty Principle Complementarity is both a theoretical and an experimental result of quantum mechanics. It holds that objects have certain pairs of complementary properties which cannot all be observed or measured simultaneously.

Heisenberg, "We have to renounce a description of phenomena based on the concept of cause and effect." Their speed and position tie together in such a way that they are confined by the tolerance of the quantum. What made the *Uncertainty (Imprecision) Principle* profound is that **Heisenberg** specified the tolerance that can be reached, namely **Planck's** quantum. **Einstein** said, re the uncertainty principle, "I cannot believe that God would choose to play dice with the world."

1927 Chemistry: Walter Heitler and Fritz London wrote the first successful quantum mechanical explanation of a chemical bond Quantum mechanics is needed to understand the nature of the *covalent* chemical bonds between atoms and to predict the structures and properties of simple molecules. .

Quantum physics Quantum physics is one of the most difficult and counterintuitive theories ever recorded in science. **Marcus du Sautoy** (1965-), Brit, mathematician, in *The Great Unknown: Seven Journeys to the Frontiers of Science* (2018) said, "One of the most curious consequences of quantum physics is that a particle like an electron can seemingly be in more than one place at the same time until is observed; at which point there seems to be a random choice made about where the particle located. Scientists currently believe that this randomness is genuine, not just caused by a lack of information. "Repeat the experiment and you may get a different answer each time."

The Great Unknown

Einstein said after one discovery, "If it is correct it signifies the end of science." His *GR* equations and his theory of gravity, were incompatible with quantum mechanics equations. He said, "As far as the laws of mathematics refer to reality, they are not certain, and as far as they are certain, they do not refer to reality."

- Feynman: Nobody understands quantum mechanics** **Richard Feynman:** (1918-88), (ref.1897,1949, '58, '75) eminent theoretical physicist, known for his work on the path integral formulation of quantum mechanics, the theory of quantum electrodynamics, and his work in particle physics later said "Quantum mechanics is the system of mechanics based on the wave-particle duality of matter and radiation, which must be used to describe systems too small for Newtonian mechanics. I am going to tell you what nature behaves like. If you will simply admit that maybe she does behave like this, you will find nature a delightful, entrancing thing. Do not keep saying to yourself, But how can it be like that?"
- Relativity & Quantum theory both explain electron orbits** "Two different theories were proposed to explain electrons' orbits, Relativity and Quantum theory. They are fundamentally different theories that have different formulations. They are incompatible descriptions of reality." "It is scientific to say only what is more likely and what is less likely, and not be proving all the time the possible and the impossible." (**Nobel** 1965)
- Physics: Heisenberg** (ref.1925) rejected causality, said that the assumption that "behind the statistical universe of perception there lies a real world ruled by causality" is "useless and meaningless" as "we can never measure sub-atomic conditions." He said, "What we observe is not nature itself but nature exposed to our [as yet imperfect] method of investigation."
- 1927 Popper** **Physics: Sir Karl Popper** (1902-94) Viennese Brit, prominent philosopher of science and Political Theory, later called quantum mechanics "one of the most fundamental scientific revolutions in the history of the theory of matter." So far, it is the most successful theoretical framework in the history of science. Nonetheless, like relativity, it is incomplete."(next **Popper** 1927, '33-35, 45, '57).
- Freud: The Future of an Illusion. The more men learn . . . the more religious belief declines** **Philosophy: Freud** (ref. 1900) *The Future of an Illusion*. "Religious ideas sprung from the same need as all the other achievements of culture: the necessity for defending itself against the crushing superiority of nature. Religious doctrines . . . are all illusions, they do not admit of proof, and no one can be compelled to consider them as true or to believe in them.
- Where the questions of religion are concerned people are guilty of every possible kind of insincerity and intellectual misdemeanor." "The more men learn the fruits of knowledge, the more religious belief declines."In 1930 he wrote that Man's conquest of nature scientifically had not made him happier. (More Freud, 1931, '33, '36, '75, 2015, pp .395-6, 442, 475, 482.)
- Bohr: Complementarity is a fundamental principle.** **Physics: Niels Bohr** (ref.1913, '23, '33), incorporated the *Uncertainty (Imprecision) Principle* (applicable only to sub-atomic particles) into his concept of *Complementarity*. Said, "We have to renounce a description of phenomena based on the concept of cause and effect." He made *Complementarity* a fundamental principle. It includes the *Complementarity* between the wave and particle theory of light. The wave and particle aspects of nature complement rather than contradict. For example, an experiment to show the particle nature of electrons (like the photoelectric effect) will not show their wave nature.
- Light acts as a wave and as a particle** **1927** Light can be viewed as a wave, for example, when it is diffracted passing through a narrow slit, or as a particle, when ejecting electrons from a metal surface in the photoelectric effect. [Under quantum theory, electrons' orbits can be elliptical and are not as precise as Bohr said.] Bohr said, "The opposite of a correct statement is a false statement. But the opposite of a profound truth may well be another profound truth." "Every sentence I utter must be understood not as an affirmation but as a question."
- Quantum physics.** **Paul Adrien Dirac** (1902-84), Brit, at 25, proved that **Heisenberg's** particle approach and the wave approach of **Schroedinger** were mathematically equivalent. The quantum world is particle and wave at the same time. **Dirac** also developed the theory of the spinning electron, a new equation for the electron, the most profound and significant general formulation of quantum mechanics.
- A quantum is particle and wave at the same time** **Dirac** also realized that the equations of quantum mechanics allowed for "anti-matter" to exist next to usual matter. He predicted a positively charged electron exists that looks just like the electron but has the opposite charge and is now called a *positron*.
(This was confirmed in 1932 when American physicist **Carl Anderson** detected electrons.)
Dirac developed an equation incorporating both the quantum theory and the theory of special relativity. He laid the groundwork for quantum electrodynamics, see 1950s.
- A science revolution in 3 years** Thus, quantum theory developed in an very short period, mainly 1924-27. By the end of the 1920s, the idea that light acts as both a wave and as particles had become, due to Bohr, the foundation of a complete theory of the sub-atomic and atomic world, called quantum physics. Bohr said, "Anyone who is not shocked by quantum theory has not understood it." Physical "reality" became more elusive. The bases of quantum mechanics are not observable or derivable. Most scientists take them on faith.
- 1927** **Dirac** also predicted that every particle possesses an anti-particle, anti-proton, etc. Said, "The measure of greatness in a scientific idea is the extent to which it stimulates thought and opens up new lines of research."

Physicists thus adopted a whole new conceptual schema called *quantum mechanics*. Only quantum laws could resolve many puzzles and explain data acquired from the atomic and subatomic realm. Even with precise measurements, the best one could hope to do is predict the *probability* that things will happen a particular way, often a high probability. His 1930 *Principles of Quantum Mechanics* became one of the standard textbooks on the subject and is still used.

1927 Solvay Conference Physics: Most of the leading physicists in the world, including nine Nobel laureates (virtually all Europeans) attended a Solvay Conference in Brussels to discuss the new quantum mechanics. **Bohr** reviewed the probabilistic interpretation of quantum theory to the satisfaction of mostly everyone but **Einstein**. Bohr and Heisenberg concluded their paper with, "quantum mechanics [is] a complete theory for which the fundamental physical and mathematical hypotheses are no longer susceptible of modification." **Georges Lemaître** was an attendee.

Nature has three different sets of laws. Physics: Thus, three vastly different sets of laws explain the physics of the universe, quantum theory for sub-atomic particles, relativity for the very large universe beyond, and classic Newtonian physics for everything in between, even for the paths of spacecraft to other planets. Newtonian physics did not explain what kept atoms together. (See 1934-Physics). Relativity and quantum mechanics were born in Europe, and came to the US only in the 1930s.

Can nature be so absurd? Physics: The whole area of quantum mechanics and quantum dynamics is inexplicable to 99% of educated persons. **Heisenberg** later said, "Talks with **Bohr** went through many hours till very late at night and ended almost in despair; and when at the end of the discussion I went alone for a walk. I repeated to myself again and again, 'Can nature possibly be so absurd as it seemed to us in these atomic experiments?' **Schrödinger** was so shocked by the implications of what he'd discovered that he admitted, "I do not like it and I am sorry I had anything to do with it."

Quantum physics was so irrational that some of the founders of quantum physicists, including **Bohr, Heisenberg, Pauli, and Schrodinger**, developed an affinity for Eastern occultist esotericism.

Quantum is immaterial for most everybody. Do we understand quantum mechanics? No. But that's okay. **Brian Silver** (1930-97), an eminent Israeli chemist, in his 1998 book, *The Ascent of Science*, said, "One point should be made clear. If we had only discovered protons, electrons, and neutrons, and never found one more [sub-atomic particle, quarks, leptons, etc], it would have made little difference to the average educated common man."

1927 Sein und Zeit Philosophy: **Martin Heidegger** (1889-1976), *Sein und Zeit / Being and Time*, a key document of existentialism. He tried to revive ontology (that branch of metaphysics concerned with the nature of being or essence.) through an analysis of *Dasein*, or "being-in-the-world." He argued that Western philosophy since **Plato** had misunderstood what it means for something to *be*, instead focusing simply on entities and their properties, thus confusing our understanding of being and human existence.

Reason is an adversary of thinking He denied mind-body dualism – he believed that we are rooted beings, inextricable from time and place. This continues to influence fields as diverse as architecture, ecology, and art history. "Thinking only begins when we have come to know that reason, glorified for centuries, is the most obstinate adversary of thinking." He was a vicious anti-Semite. He faded from public life.

1927 Lemaître Cosmology: **Georges Lemaître** (1894-1966), a Belgian Catholic priest, astronomer, mathematician, and professor of physics at the Catholic U, not believe by most astronomers. at Louvain, was the first to propose that galaxies receding is explained by an expanding universe. He presented his theory of an expanding universe, but not from a single point but from **Einstein's General Relativity** equations concept of a static universe. **Lemaître** first derived the redshift-distance relation (further away galaxies recede proportionately faster than closer ones.

Universe is expanding. Not believed by most astronomers He published his theory and an estimate of *Hubble's Constant* (the relation between a galaxy's receding velocity and its distance from the observer, ref. 1929-**Hubble**) in a little read journal. At the Solvay Conference most cosmologists and astronomers, including **Hubble**, did not credit **Lemaître's** work. An expanding universe was not generally accepted. **Einstein** was critical; said **Lemaître's** math was okay but the physics was abominable. Most astronomers including Einstein thought that the universe was static. **Lemaître and Hubble** greatly exploded knowledge of the universe.

Are humans accidental or intended? This issue had filled theology & philosophy since Darwin. Philosophy, Are humans accidental? **Thorton Wilder** (1897-1975), after six years of effort, published *The Bridge of San Luis Rey*. Set in rural Peru in the 1700s It relates Franciscan Brother Juniper's attempt to find a divine purpose for life to explain the accidental collapse of a bridge in his village that took a few lives. The first and last chapters are *Perhaps an Accident* and *Perhaps an Intention*. They represent the debate that had occupied the minds of theologians and philosophers since Darwin had shown the random (non-purposeful) nature of human (and all natural) life in 1859. People don't want to think their life is pointless, accidental. By definition, an accident can't have a

divine cause, but he didn't want the collapse of the bridge to be God's intention. The friar desperately dreamt of experiments "to justify the ways of God to man" (**Milton**). He was unsuccessful. Accidents presumably have causes. But as he said that proof was needed that the world was intended, this was blasphemy in the eyes of the Church. So it burned Juniper at the stake. It won the 1928 **Pulitzer** for fiction.

- 1927 **Philosophy:** **Hermann Hesse** wrote *Steppenwolf*, a Faust-like and magical story illustrating his philosophy and deep sense of humanity. The story describes the humanization of a middle-aged man who dislikes and avoids others. He saw himself as half-human and half-wolf.

The story can be seen as a plea for self-examination and an indictment of intellectual hypocrisy. He said, "Knowledge can be communicated, but not wisdom."

**Don't
believe
blindly**

Philosophy: **Bertrand Russell** published, *Why I am not a Christian*. Said, "It is undesirable to believe a proposition when there is no ground whatsoever for believing it to be true.

I regard [religion] as belonging to the infancy of human reason, and to a stage of development we are outgrowing . . . Science is what you know; philosophy is what you don't."

1927
Russell

Why I am not a Christian critiqued arguments for God. Re the *First Cause Argument*, "If everything must have a cause, then God must have a cause. If there can be anything without a cause, it may just as well be the world, so that there cannot be any validity in that argument." (**Hume's** 1779 argument). "It is exactly of the same nature as the Hindu's view that the world rested upon an elephant and the elephant rested upon a tortoise; and when the boy said, 'What does the tortoise stand on?' The Indian said, 'Suppose we change the subject.'" **Russell** reputedly once asked an old lady what the tortoise stood on. She replied, "You don't fool me, its turtles all the way down."

**It's turtles
all the way
down.**

**People
believe
what they
are taught**

Re the *Cosmological Argument*, **Russell** disputed that the universe was contingent just because objects within the universe are. This is the logical fallacy of composition (p. 443-logical fallacies) "The main reason why people believe in God is simply because this belief is inculcated in them from early infancy. We believe, first and foremost, what makes us feel that we are fine fellows."

**The
world is
poorly
designed**

Russell also critiqued the *Design Argument*, "If one contends that a divine mind needs no designer, one could just as logically say a well-ordered natural world needs no designer." Also, "Why did God, if he is immortal, create mortal humans; why not create immortal humans?" (Gilgamesh's question to Marduk.) "Do you think that, if you were granted omnipotence and omniscience and millions of years in which to perfect your world, you could produce nothing better than the KKK or the Fascists?"

**Passage
of time
refutes the
Design
Argument**

"Moreover, if you accept the ordinary laws of science, you have to suppose that human life and life in general on this planet will die out in due course. It is a stage in the decay of the solar system; at a certain stage of decay you get the sort of conditions of temperature and so forth which are suitable to protoplasm, and there is life for a short time in the life of the whole solar system. You see in the moon the sort of thing to which the earth is attending - something dead, cold, and lifeless." This argument is the *Underachiever Problem* of the *Design Argument*.

1927

**Problem of
Suffering:
The world is
too full
of misery**

Russell on the *Problem of Suffering*, The world is so full of cruelty, evil, and suffering that it could not have been created by a loving, omniscient supernatural entity." **Russell** also argued that if an omniscient God existed, he foresaw the evils people would do and chose to allow it. (**Spinoza** said in 1670)

Also, "No god with supernatural powers would ever need for his priests to ask for money. God could fix it." Such god would also, as **Russell** suggests, make a better world in a hundred ways.)

**Women in
Britian**

Women: In Britain, women were allowed to vote if they owned property or were a graduate of a UK university, so poor women couldn't vote. This is little better than Muslim treatment of women.

History of Science: **George Sarton** (1884-1956) Belgian American, is credited with founding the history of science as a separate discipline. From 1927-47, he published *Introduction to the History of Science*, three volumes in five books, 4,296 pages. Science writer **Michael Shermer** (1954-) explained that philosophers of science have two approaches, called the *internalist* and *externalist*.

Internalists focus on the internal workings of science independent of its larger cultural content: the development of ideas, hypotheses, theories and laws and their internal logic.

**Under-
standing
science**

Sarton's approach was *internalist*: 1. Studying the history of science is only justified by its relevance to current and future science. So study science to see how its past has shaped its development. 2. Science is systemized positive knowledge, and acquiring such knowledge is the only activity truly cumulative and progressive. 3. Although science is embedded in culture, culture does not appreciably influence it. So concentrate on science's inner workings. 4. That being said, science is the most important contribution to man. So it's the most important thing one can study.

In contrast, *externalists*, focus on putting science in the larger cultural context of religion, politics, economics and ideologies and considers the effect these have on the development of scientific ideas. (Physicist **Thomas Kuhn** began the *externalist* approach in 1962 when he introduced the concepts of *scientific paradigms* and *paradigm shifts*.)

1927 Conditioned reflexes

Psychology: Ivan Petrovich Pavlov (1849-1936), the most outstanding Russian scientist in modern times, devoted his early years studying the digestion and the intestine. During his researches of digestion, he observed that a dog secretes saliva and gastric juices not only as he was eating but from the smell of food or other indications that he was going to be fed.

His work there was so important that he got the Nobel prize in Physiology in 1904.

From 1902 til his death he studied the physiology of the higher nervous activity. He used dogs as their brains are essentially comparable to humans. He studied reflex actions, both natural and conditioned. Ordinary natural reflexes are often called instincts. In simplest terms, he rang a bell, then fed his dogs. After some repetitions, the dogs see a connection between the bell and food and would salivate at the sound of the bell even when no food was produced.

This showed that dogs (and humans) can be conditioned to have certain reflexes based on an induced event. He wrote *Conditioned Reflexes; an Investigation of the Physiological Activity of the Cerebral Cortex*. In modern psychology, conditioned reflexes have been significant.

He made psychology a branch of science rather than a subdivision of philosophy.

1928 Science historian **Richard Olsen** suggested seeing science as both a producer and a product of culture. All agree that social phenomena and cultural traditions *do* influence theories, which in turn determine how facts are interpreted; which interpreted facts then reinforce theories and so on.

Shermer's view: Scientific progress is the cumulative growth of a system of knowledge in which over time, useful features are retained and useless features are discarded by the scientific method.

1928 Communism

Mao TseTung, a founder of the Chinese communist movement; began his life's work, to bring communism to China. He said, "Arms are an important factor in war. . . but not the decisive factor. Man, not material, is the decisive factor." (He led his communists to complete control in 1949.)

1928 **Philosophy: Cornelius Van Til** (1895-1987), Dutch-American, began a school of thought popularly called *Presuppositional apologetics*. (He said "transcendental " would be more accurate).

Presuppositionalists don't believe the existence of God can be proven by a appeal to raw facts, but God's existence is proven by the very same belief and is the necessary condition to the intelligibility of all human experience and action.

They argue that all human experience and action (even the condition of unbelief) is proof the Christian God exists, as God's existence is the necessary condition of their intelligibility. Critics say that this merely *assumes*, not *proves*, the truth of Christianity and the falsity of other religions.

Structure of the World

Philosophy, the "Vienna Circle:" Formed to reformulate philosophy in a scientific way, looked to relativity and its reformation of central concepts as their primary motivation..

Rudolph Carnap (1891-1970), German, wrote *The Logical Structure of the World*. He was a proponent of the "verification principle." That is, anything that might count as a contribution to human knowledge can be justified by experiment and observation or is a tautology.

1928 **Law, Religion: Charles Smith**, president of the American Association for the Advancement of Atheism was convicted twice in Arkansas for blasphemy. As an atheist, he couldn't be sworn in to testify for himself.

Henry Luce: America needs a new moral leader, Mussolini

Fascism in America: US press lord **Henry Luce** (ref. 1923) said, "America needs at this moment a new moral leader, a national moral leader. The outstanding moral leader of the world today is Mussolini." **Luce** praised **Mussolini** as "a gift of Providence, free from the prejudices of the liberal school." **Luce** wrote an article saying the *US Constitution* was obsolete and called for a new form of government During 1926-28, **Mussolini** negotiated an agreement with pope **Pius 11**. He promised the pope that he would do nothing to the Jews that the Catholic Church had not already done.

Pius 11 sold out his Catholics for \$100M

The Pope's betrayal: In return, Pius 11 agreed to support Mussolini's fascism. pledged the Church's "perpetual neutrality in international relations." **Pius11** said, "No sincere Catholic can be a true Socialist." In short, the pope sold his worldwide influence and prestige for fascist money. **Mussolini** soon had school children praying to him, not to God. The pope did not protest.

Hitler used the pact

Hitler used the pact. He said, "That the *Curia* is now making its peace with fascism shows that the Vatican trusts the new political realities far more than did the former liberal democracy". "That the Catholic Church has come to an agreement with Fascist Italy. . . proves beyond doubt that the

fascist world of ideas is closer to Christianity than. . . Jewish liberalism or even atheistic Marxism.”

1929 Philosophy: **Ernest Hemingway**, *A Farewell to Arms*, There isn't always an explanation for everything.

1929 Astronomy: **Cecilia Payne** (1900-79), astronomer, in 1925 had deduced that the Sun is over 90% hydrogen. **Henry Russell**, a senior astronomer advised her not to publish it as most astronomers disagreed. He soon realized **Payne** was correct. He published his findings and credited her. Astronomer **Otto Struve** said **Payne's** work was "the most brilliant *Ph.D thesis* ever written in astronomy." She overcame many slights as a woman and became the first woman to chair a Harvard Department.

1929 **Hubble**
Astronomy timeline, pp. 432-37
Astronomy: **Hubble** deduced that the cloudy blobs of light visible among distinct stars appearing in our *Milky Way* were actually groups of stars far beyond the *Milky Way*. The term galaxy comes from the Greek word for Milky Way, *galaxias*. His powerful telescope let him identify individual stars in some galaxies. He measured the degree of redness of the redshifts of various galaxies, which meant that they were receding from Earth at different speeds. He confirmed that the *Andromeda galaxy* (named *Andromeda* as it *appears* to be in the *Andromeda constellation* in our *Milky Way* galaxy) was *approaching* Earth as it had a blueshift, one of the few galaxies that does. (

How so, if the universe is expanding? One would logically think that all stars and galaxies would be moving away from all other stars and galaxies and have a redshift. Answer, within a cluster of galaxies, where gravity can have an appreciable effect, galaxies can gravitationally move toward one another.

The Andromeda galaxy is in the same cluster of galaxies as our Milky Way galaxy.

As gravity has an inverse ratio to the amount of separation, the galaxies are speeding up as they approach one another. (As Earth is in that cluster, all galaxies in that cluster must be moving together)

Galaxies' receding speed is proportional to distance from Earth
Hubble and **Milton Humason** saw the speed a galaxy receded and its distance from Earth correlated, That is, the further away, the higher the speed. Mathematically, it's the **Hubble's Constant**.
This was then the strongest evidence for **Lemaître's Dynamic Evolving model, i.e., the universe was expanding**. In retrospect, it was realized that a static universe would collapse in itself due to gravity.
Although **Carl Wirtz** in 1922 and 1924 had noted the correlation between between redshift and distance before **Hubble**, it became known as **Hubble's Constant**. Distances *between* galaxies are so great any gravity influence among them is infinitesimal. So the universe expands. Within a galaxy, stars are close enough to each other so that their gravity and centrifugal force are in balance.

1929 **Hubble** classified galaxies according to their approximate shape (spirals, ellipticals, lenticulars, irregulars) in the still-used **Hubble Sequence**. **Humason**, eventually measured red-shift receding speed of 800 galaxies. **Hubble** then calculated the distances to these galaxies.

Great Depression
The central banks of the US, England, Germany, and France were privately owned and not regulated. They tried to restore the gold standard, abandoned during the Great War. The unregulated excesses of Wall Street speculators bid up stock prices to unreal levels which led to the Great Depression.

1929 **US Stock Market Crash. The Great Depression.**
Before the market crash that began the Great Depression, **Thomas Lamont**, then head of J P Morgan and Co, admirer of fascism, assured President **Hoover** that there was no cause for concern, and no need for government intervention, as all was well. He said, "The future appears brilliant." The market crashed five days later. (A Senate investigation later learned that during the crash, J P Morgan had let politicians including **Calvin Coolidge** and prominent bankers to sell their stocks at above market prices. That is, cheating their non-prominent clients.) The depression spread worldwide
Lamont again. (**Lamont's** biographer, **Ron Chernow**, wrote that in 1931 **Lamont** wrote a false report blaming China for an act of sabotage in Manchuria, the *Mukden incident*, which Japan used to justify invading Manchuria. The US and League of Nations found that Japan itself was responsible for the sabotage.)

1929 **Free thought**
Law: **Oliver Wendell Holmes Jr**, (ref 1895). "If there is any principle of the *Constitution* that more imperatively calls for attachment than any other it is the principle of free thought - not free thought for those who agree with us but freedom for the thought that we hate."
"The best test of truth is the power of a thought to get accepted in the competition of the market. The ultimate good is better reached by free trade in ideas. Every idea is an incitement."

1929 Learning: **Jean Piaget** (1906-80), Swiss, pioneer of the constructiveness theory of knowing. "Children develop how to learn differently at different stages of development, learn moral development in stages."

1929 **Franz Boas** (ref 1887,1906): Anthropologist. Claims of genetic intelligence differences among racial groups are unscientific. His *Anthropology and Modern Life* refuted the concept of a master race.

Political Theory: **John Dewey** (ref. 1916), in *The Quest for Certainty*, wrote, "The quest for

All political systems exploit some to favor others.

certainty is a quest for a peace which is assured, an object which is unqualified by risk and the shadow of fear which action casts." "Quest for complete certainty can be fulfilled in pure knowing alone. Such is the verdict of our most enduring philosophical tradition."
"No system has ever existed which did not in some form involve the exploitation of some persons for the advantage of others." He separated theory and practice, a separation that can only be overcome by an appreciation of the value of uncertainty, and a settling for probability."

1930 Viet-Nam: **Ho Chi Minh** began his 39 year struggle for Viet-Nam independence from France.

1931 Cosmology: **Lemaitre**, (ref. 1927), said that the universe expanded from a single point that he called the *Primeval Atom*. He said it was "the Cosmic Egg exploding at the moment of the creation."

Eddington (ref. 1912, '14-15, '19), was skeptical. He said that as gravity and **Einstein's** cosmological term were so precariously balanced that a small perturbation would cause runaway contraction or expansion. **Einstein** accepted **Lemaitre's** expanding universe, went to Mt. Wilson to thank **Hubble**, said that **Friedmann** and **Lemaitre** were right, that **Lemaitre's** theory was the most beautiful and satisfactory explanation of creation. He gave up his cosmological term, which he said his greatest mistake.

Political Theory: **Gandhi** (ref. 1775 BC, 1896, 1924), visited England. A journalist asked, "Mr. **Gandhi**, What do you think of Western civilization?" **Gandhi** replied, "That would be a good idea." (More 1947)

1931 **Godel: Incompleteness Theorem**

Math: **Kurt Godel** (1906-78) German-American, announced two *Incompleteness Theorems*. "In any formal system that contains the arithmetic of natural numbers, if the system is consistent, there is a formula which can't be proved or disproved. Neither it nor its negation is deducible from its axioms.
 1. For any self-consistent recursive axiomatic system powerful enough to describe the arithmetic of the natural numbers (for example, **Peano** arithmetic), there are true propositions about the natural numbers that cannot be proven from the axioms. 2. Neither the axiom of choice nor the continuum hypothesis can be disproved from the accepted axioms of set theory, if these axioms are consistent."

American Legion

Fascism in America: The American Legion, the US's largest veterans organization, with a racist history, passed a resolution praising **Mussolini** as a great leader. The Legion said immigrants "pollute American stock." The American Newspaper Guild said, "The Legion breaks more strikes than the National Guard and the police." When his car killed a child, **Mussolini** said, "It was only one life. What is one life to the affairs of state?"

1931 English nobility: **Richard Rhodes**, U S historian, "The landed classes neglected technical education, studied only classics. As late as 1930, after **Rutherford** at Oxford had discovered the atomic nucleus and begun transmuting elements, the physics laboratory was not wired for electricity."

1931 Physics: **Ernest Lawrence** (1901-58) invented the cyclotron. It let scientists explore inside atoms. Nobel 1939.

Freud erred

Psychiatry: **Carl Jung** (1875-1961), "By understanding the unconscious we free ourselves of its domination. Contrary to **Freud**, he said that sex is not all-important; the inherited collective unconscious and one's aims and aspirations are." "As far as we can discern, the sole purpose of human existence is to kindle a light in the darkness of mere being."

The Scientific Outlook

Science: **Bertrand Russell**, his *The Scientific Outlook* said, "150 years of science have proved more explosive than 5,000 years of pre-scientific culture. It would be absurd to suppose that the explosive power of science is exhausted, or has even reached its maximum. It is far more likely that science will continue for centuries to come to produce more and more rapid changes."

Religion stifles knowledge. Most people are silly

Religion and knowledge: **Russell**, "The chief obstacle to the knowledge that leads to happiness is the teaching of religion. Religion prevents our children from receiving a rational education. It prevents us from removing the fundamental causes of war. It prevents us from teaching the ethic of scientific cooperation in place of doctrines of sin and punishment."
 "That an opinion is widely held is no evidence that it is not utterly absurd. Indeed, in view of the silliness of the majority of mankind, a widespread belief is more likely to be foolish than sensible."
 "One should not attack religion as religion makes men virtuous. So I am told. I have not noticed it."

1931 **Robert Millikan** (1868-1953) physicist, **Nobel** 1923: "Three ideas stand out as the most influential for the human race, the *golden rule*, natural law [science], and age-long growth, or evolution."

Smedley Butler, The American

Capitalism, the American Empire: Major General **Smedley Butler** (1881-1940) Marine commandant of Quantico. Most decorated Marine in history, He had received 16 medals, 5 for heroism. He is one of 19 men to receive the Medal of Honor twice. He became a critic of how US Marines were tools of

- military was a tool of Wall Street** American imperialism. He said, "I spent 33 years mostly as a high-class muscleman for Big Business, for Wall Street and the bankers. I was a racketeer for capitalism. I helped make Mexico safe for American oil interests." "I brought light to the Dominican Republic for American sugar interests. I helped make Haiti and Cuba a safe place for National City Bank. I helped in the rape of half a dozen Central American republics for the benefit of Wall Street. In China, I helped see that Standard Oil went its way unmolested."
- He severely criticized war profiteering of US companies during World War 1 in "*War Is a Racket*".
- 1932 **The ruling class controls the press, schools, & usually the Church** Political Theory: Einstein, (ref. 1779, 1805, 61-62, 86, 95, 1900, 05-07, 12, 14-15, 19, 21, 24, 27, 30). "The minority ruling class at present has the schools and the press, usually the Church as well, under its thumb. This enables it to organize and sway the emotions of the masses, and make its tool of them." During the 1930s, the combination of the Great Depression and the memory of losses in the Great War contributed to pushing American public opinion and policy toward isolationism."
- Isolationists wanted America to stay out of European and Asian conflicts and international politics.
- 1932 **The intelligentsia were nurses to the rich** Philosophy: Maksim Gorki / Alexei Peshkoff (1868-1936), Russian, wrote *To American Intellectuals*, "The function of the intellectual has always been confined, in the main, to embellishing the bored existence of the bourgeoisie, to consoling the rich in the trivial troubles of their life. He wrote, The intelligentsia were the nurse of the capitalist class. It was kept busy embroidering white stitches on the philosophical and ecclesiastical vestments of the bourgeoisie—that old and filthy fabric besmeared so thickly with the blood of the toiling masses . . . The press of Europe and America busied itself assiduously and almost exclusively with the task of lowering the [low] cultural level of its readers."
- Darwin and Mendel melded in the grand synthesis, by random genetic mutations** Biology: J B S Haldane (1882-1964), Brit (studied physiology, genetics, evolutionary biology, and mathematics), and **R A Fisher** and other biologists reconciled *Darwinism* with **Mendel's** genetics in the *grand* or *modern synthesis* a/k/a *Neo-Darwinism*, which caused both to become widely accepted.
- Basically, **Mendel** explained how physical variations came about, namely random genetic mutations. **Darwin's** basic principles of natural selection remain valid but biologists have refined it. The study of biology became more sophisticated. Evolution by *Natural Selection* is simple and profound and is now universally accepted by scientists, but not by some religious sects and Muslims.
- Haldane: Proof that all organisms are descended from one ancestor** Proof that all organisms are descended from one ancestor. "Most of our structural molecules are asymmetrical, as shown by the fact that they rotate the plane of polarized light, and often form asymmetrical crystals. But of the two possible types of any such molecule related to one another like a left and right boot, only one is found throughout living nature."
- Haldane** said that all it would take him to admit that evolution was wrong was a pre-Cambrian land animal fossil. The pre-Cambrian geologic period lasted 80% of Earth's existence. His point was that land animals didn't exist for the first 80% of the Earth's existence.
- 1932 **Chadwick proved Neutrons** Physics, atoms' nuclei: Sir **James Chadwick** (1891-1974), Brit, was a student and then a colleague of **Rutherford** who in 1920 had suggested that there were other particles in an atom with no charge. He called them neutrons. In 1932, he verified **Rutherford's** 1911 theory that atoms have a tiny dense nucleus of positively-charged protons orbited by negatively charged electrons.
- Chadwick** found neutrons. He said there were particles with almost the same mass as protons but no electrical charge, so they aren't repelled by protons in the nucleus.
- Atoms thus are known to be comprised of neutrons, protons, and electrons.
- With no electrical charge, neutrons can be fired into protons without causing electrical disturbance. This is theoretically true but hard to do. (Physics **Nobel** 1935)
- Neutrons do have a small magnetic component as they have the same mass as a proton.
- Positron** Physics, positron: **Carl Anderson** (1905-81), American, studying under **Robert A Millikan** while analyzing cosmic rays, discovered another particle, a positron, a particle with the same mass as an electron (1/1836 of a proton), but with a positive charge, as **Dirac** had predicted in 1928.
- c.1932 **Aldous Huxley, Brave New World** Political Theory, authoritarian future: **Aldous Huxley** (1894-1963), Brit, grandson of **Thomas Huxley**, wrote *Brave New World* (title from **Shakespeare's** *Tempest*), set in 2540, described an anti-utopian totalitarian world where a genetically superior *Alpha* class used total mind control, a fake religion, and a pleasure drug, *soma*, to rule over masses of genetically engineered inferior working classes made up of identical clones. There was only one religion, run by the state. The working classes knew their place in society and were obedient and happily drugged up. The plot concerned a few rebels.
- Huxley quotes Why believe in gods?** "The proper study of mankind is books. Facts do not cease to exist even if they are ignored. That all men are equal is a proposition which in ordinary times no sane individual has ever given his assent. Several excuses are always less convincing than one. Why did it occur to anyone to believe in

only one God? Or, conversely why did it ever occur to anyone to believe in many gods?" (1928)

Aldous Huxley
quotes
"I do not
invent my
best
thoughts.
I find them.

"Human beings have a strong tendency toward rationality and decency. If they had not, they would not continue to legitimize their prejudices and their passions. . . I do not invent my best thoughts, I find them." "Reality cannot be ignored except at a price; and the longer the ignorance is persisted in and the more terrible becomes the price that will have to be paid." "Most theories of the state are merely intellectual devices invented by philosophers to prove that those who have power are precisely the people who should have it." (The lapdog intelligentsia)

Huxley
quotes

"It is man's intelligence that makes him so often behave more stupidly than the beasts. Humans are impelled to invent theories to account for what happens in the world.

Unfortunately, they are not quite intelligent enough, in most cases, to find correct explanations. The greater a man's talents, the greater his power to lead astray.

People believe in God because they've been conditioned to believe in God." (1936)

"Death is the only thing we haven't succeeded in completely vulgarizing."

- 1932 Astronomy: **Karl Jansky**, American physicist /radio engineer. Discovered radio waves from the *Milky Way* constellation *Sagittarius*. Then detected radio waves from all over the universe. (More pp. 430, 436)

Astronomy: **Jan Oort** (1900-92), Dutch, discovered that the density of matter near our Sun was almost twice what could be explained by planets and known gas which their gravitational force would indicate. If the known visible matter were the only matter near our Sun, our planets would spin out into space. He said something with a gravitational force must be keeping our planets from flying apart into. (see pp. 435-6)

- 1933 Political Theory, fascism: **Franz von Papen**, leader of the German Catholic Party, caused his party (formerly anti-Nazi) to join in a coalition with **Hitler's** Nazi party, (ref.1922, '25) whose Nazi movement had become a political force, and persuaded the President of Germany, **Paul von Hindenberg**, to appoint **Hitler** as Chancellor (Prime Minister). He did so January 30.

Protestant
theologians
said Nazism
is a call to
God. Make
Germany
great again

The German Catholic bishops congratulated **Hitler** on becoming Chancellor. Fifteen Protestant theologians issued a proclamation saying that Nazism is a "Call to God." Thus, Catholic and Protestant churches supported **Hitler** and helped him carry out his plan of German glory. . . .

Geoff Layton (1957-), Brit, named the dominant Nazi themes: 1.The *Führer* cult. **Hitler** as a messiah-figure, 2. The *Volksgemeinschaft* / national community) to appeal to the people to develop a unifying idea, nationalism, to exploit the discontent since WW1. 3. To make Germany great again.

Catholic
opposition
to Hitler

Hitler suppressed labor unions to help industrialists. There was some Catholic opposition to **Hitler**. The Bavarian bishops directed their clergy to warn against Nazis. A member of the Catholic Center Party in the Reichstag, described Nazis as "a brutal party that would do away with the rights of the people."

Alfons Wild, a Catholic author, said **Hitler's** message was violence and hate.

Hitler wanted to reduce such opposition. He began negotiations with Cardinal **Pacelli**, the Vatican secretary of state (soon to be Pope **Pius 12**), for a treaty to legitimize him in Germany and internationally. **Pacelli** in turn wanted more Vatican control over German Catholics' independence.

Pacelli saw no role for a lay-clerical pluralism within the pyramidal structure of papal power. He wanted a docile Church and collaboration with the Nazis over the continued existence of the Catholic Center party." So he made the Party dissolve. He wanted the Vatican's *Code of Canon Law* imposed on all German Catholics. **John Cornwell's Hitler's Pope** is a chilling account of **Pacelli's** (Pope **Pius 12**, pope 1939-58) life-long mission to destroy the independence of the Catholic Church of Germany. He wanted Catholics prohibited from political activities

Concordat
was signed
quickly

The *Concordat* was signed in record time July 30. **Pius 11** had a celebratory mass for it. **Hitler** gave 10% of Catholics' and Protestants' taxes back to the church leaders, about \$100 million each year, and paid priests salaries. *Article 16* required the German bishops to sign a loyalty oath to **Hitler**. Even the Poets Section of the Prussian Academy of Arts were made to sign a loyalty oath to Hitler

The Pope
surrendered
his Catholics

The *Concordat* also required all clergy to abstain from working in or for political parties.

The German Catholic Church issued a statement. It ignored its past criticism of Nazism. It ordered the laity to be loyal to **Hitler's** regime. It raised **Hitler's** prestige internationally.

The Pope
chose Hitler's
money

The *Concordat* silenced those clergy who could have opposed him. It bound all Catholics to the state. If **Hitler** chose to disregard it, which he soon did, there was no legal way to challenge him. In short, the pope was on **Hitler's** and **Mussolini's** payroll.

The Concordat is still in force. The German government pays priests' salaries.

Benjamin Franklin once said, "Those who would give up essential liberty to purchase a little temporary safety, deserve neither liberty nor safety."

Many Germans were ready for Hitler

Fascism: Anti-Semitism was basic to **Hitler's** governing philosophy. **Hitler** did not invent anti-Semitism. It was deep in German culture. Anti-Semitism was higher among more religious Germans. **Martin Luther** (ref.1543) and the Catholic Church taught it.

Hitler gave Germans Jews to blame and hate (standard fare for demagogues). He blamed Marxists, Gypsies, foreigners, but mainly Jews, for Germany's ills.

Racism gives the lowest category of man, from ignorant Whites in the US to lower class persons everywhere someone whom they can feel superior to.

Hitler destroyed the entire legal profession and judicial system of Germany by barring Jewish lawyers and judges from the German courts and forbidding Jewish lawyers from doing business with the German government. It did not cause any formal protests or objections from non-Jewish lawyers or judges or any legal bar associations.

1933
Dark Matter

Astronomy: **Fritz Zwicky** (1888-1974), Bulgarian-American, saw the gravitational effect of eight galaxies in the rotating Coma cluster of galaxies was 400 times stronger than their calculated mass indicated. He deduced that there was some non-visible matter with gravitational effect in the cluster keeping it together. He called it *dark matter*. He published this in the little-read Swiss journal *Helvetica Physica Acta*. It was not noticed until the 1970s. (More **Zwicky** 1970s, p. 434)

Philosophy: **Vladimir Illich Lenin** (1870-1934) "Religion is a form of spiritual oppression which everywhere weighs upon the masses who are crushed by continuous toil for others, by poverty and loneliness."

1933 Political Theory: **Alfred E Smith**, NY governor. "The ills of democracy can be cured by more democracy."

Lemaitre:
The universe expands

Astronomy, **Lemaitre** (ref 1927, '30) published a detailed version of his expanding universe theory. He became famous. **Neil deGrasse Tyson** (1997, 2015) later detailed it, "In the beginning, nearly 14B years ago, all the space and all the matter and all the energy of the known universe was smaller than one-trillionth the size of the period that ends this sentence."

The Enlightenment wised up the Church to actual justice and compassion

Philosophy: **Albert Schweitzer** (1875-1965) Alsatian, doctor, composer, philosopher, organist, *Out of my Life and Thought*, put common sense into religious belief. Said, "For centuries, Christianity treasured the great commandment of love and mercy as traditional truth *without mentioning* slavery, witch burning, torture and other ancient and medieval forms of inhumanity."

Only when Christianity experienced the power of the thinking of the *Enlightenment* that it was stirred into the struggle for humanity. The remembrance of this ought to preserve forever assuming any air of superiority of [Christian] dogma in comparison with thought.

1933
White supremacy has justified injustice worldwide.

Racism: **Albert Schweitzer's** hopeful sentiments were not universally held. The claim of the superiority of a dominant ethnic, racial, or religious group over a weaker group is a worldwide phenomenon. West's claim of White superiority and supremacy is such a phenomenon.

Racists are statistically dumber than non-racists. (See 2012, 22 year study in the UK conducted by **Gordon Howard** of Brock University, Ontario)

Racists are likely just dumb.

The list is long of times Caucasians have mistreated weaker folk; the European colonial system, the Caste system, slavery, US treatment of Blacks, Orientals, children, and Indians, The US's "*Manifest Destiny*", the US on Indians, Australia on its Aborigines,, US and Canadian "Chinese Exclusion Acts", the fascist Nazis, New Zealand on Maoris, US and Canada's internment of Japanese, "Yellow Peril scare, the Ku Klux Klan," "Jim Crow" laws.

Luther Standing Bear, educator and Chief of the Sicangu and Oglala Lakota tribes said, "Parts of the white man's civilization (to rob, to maim) are sickening. Is this progress?"

1933 German industrialists, militarists, professors, like American industrialists, used "Survival of the fittest" to justify their social policies. **Einstein**, visiting the US, renounced German citizenship and took a position at the *Institute for Advanced Study of Mathematics* at Princeton. He stayed there until he died.

Hitler called newspapers *lügenpresse* lying press.

Fascism: Germany was a literate, educated country of **Beethoven, Goethe, Kant, and Schiller**. **Hitler** destroyed the German tradition of scholarship, denigrated science and scientists who opposed his Aryan supremacy views. He promised a new vision of leadership, said democracy was corrupt, incompetent, and unable to act decisively. *Mein Kampf* had said how important propaganda was. Some newspapers were critical of him. To discredit them, he called them the "*Lügenpresse*," the "lying press."

Big lies work better than small ones.

Political Theory, fascism. *Mein Kampf*, "the broad mass of a nation. . . will more easily believe a big lie than a small one." "The German has no idea how much the people must be misled if the support of the masses is required." These insults were deleted from future editions and from the English translation, first made in 1933. It is far easier to mobilize people to *oppose* something (real or made up) than to support a cause.

Make Italy **Mussolini** promised Italians that he would restore Italy to the grandeur of the Roman empire.

Great Again **Hitler** similarly promised he would make Germany a great nation again. This political slogan is powerful and not unique. In America, **Ronald Reagan's** campaign slogan was "*Let's make America Great Again.*" **Trump's** political theme is "*Make America Great Again.*"

1933 Political power: A social or political statement does not have to be correct to be influential. It only has to appeal to enough people, as **Machiavelli** (ref.1532) and the history of anti-Semitism demonstrates.

False stories like religions & ideologies can give one power. Recall, **Yuval Noah Harari** (ref. 1484,1532), a current philosopher and historian, wrote, "*Scientific truths* are based on facts, experiments, mathematical truths, and measurements. The *other kind of truth*, or the *other kind of stories*, are the stories that enable you to control people. They are the basis for society. Things like religions and ideologies and so forth. And here you don't need the truth for power. Power is based on making a lot of people believe the story. It may not be true. It's not true that if a story is false, that it will not be effective. No way! You can have enormous social power by making a lot of people believe in fiction." (More **Harari** 2014-5, pp. 395, 402, 420, 437. A cleaned up abridgment of *Mein Kampf* was published in English in October 1933.

Mein Kampf in English

Hitler used patriotism **Hermann Göring**: (1893-1945) (ref. 1532), *Luftwaffe* chief, second to **Hitler**, illustrated **Harari's** words: "Naturally the common people don't want war. It is always a simple matter to drag the people along. That is easy. All you have to do is tell them that they are being attacked, and denounce the pacifists for lack of patriotism and exposing the country to danger. It works the same in every country."

Political Theory, propaganda: **Will Durant**: "You can't fool all the people all the time, but you can fool enough of them to rule a large country." **Alfred North Whitehead**, (ref.1912-13), "In the real world it is more important that a proposition be interesting than that it be true."

Physics, astronomy, the Sun: **Arthur Eddington** (ref. 1912, '14-15, '19, '29-30) said that the Sun was millions of degrees hot. He also affirmed that galaxies were flying apart.

Astronomy, radio waves: Bell Labs discovered that radio waves were coming not just from the Sun, but from stars all over the universe. This was the first knowledge of radio astronomy which can detect stars / galaxies beyond the vision of our biggest telescopes. (More 1965)

1933 **la condition humaine** Philosophy: **Andre Malroux** (1901-76), French novelist, leader in the Resistance, statesman. He was an influence on the existentialist thought of **Jean-Paul Sartre** and **Albert Camus**. His principal work was *la condition humaine* where he portrayed the human condition as a tragic state characterized by alienation and absurdity resulting from Western civilization's loss of faith in God.

1933 Political Theory: **Spengler** (ref. 1919), *The Hour of Decision*, "Christian theology is the grandmother of Bolshevism. Socialism is the capitalism of the lower classes." (Similar to his 1919 statement)

c.1933-35 **If is isn't falsifiable, it isn't a scientific statement** Science, philosophy: **Popper** (ref 1927) in *Logik der Forschung / The Logic of Scientific Research*, said. "If a scientific statement speaks about reality, it must be falsifiable and if it is not falsifiable, it does not speak about reality." In other words, "Logically, no number of positive experiments can confirm a scientific theory, but a single example can show it is false, i.e., *scientific* theories are falsifiable. "Falsifiable" does not mean something *is* false. Rather, *if* it is false, then in principle, it could be shown false. For **Popper**, the word *scientific* meant *cognitively meaningful*. **Popper** also considered religions as primitive myths as psychiatric theories couldn't be falsified, (**Freud's** theories were outside science as they couldn't be tested **Popper's** account of the logical asymmetry between verification and falsifiability is the heart of his philosophy of science. He described his philosophy as "critical rationalism", a phrase he coined. He rejected classical empiricism.

Universal generalizations can't be verified. For example, a *universal generalization* (all crows are black) can't be verified. That would take seeing every crow. But it can be falsified (find a white crow). Thus it is *falsifiable* (so it's a *scientific* statement, not necessarily true, Conversely, *existence* statements (*unicorns (or a god) exist.*) can't be proven false, as one can't prove some unicorn (or a god) never existed. As *existence statements* can't be falsified, they are outside science. *Existence* statements *can* of course be verified, a unicorn (or a god) shows up.

Existence statements can't be falsified.

It depends on the definition

Popper said, "All criticism consists in pointing out some contradictions or discrepancies, and scientific progress consists largely in the elimination of contradictions wherever we find them."

Caveat, Whether a god/God can be proven to exist or not depends on the definition of the god/God. If the god is defined as a flying elephant, a physicist can scientifically prove that god doesn't exist.

If the god/God is defined as nature, then, by definition, such god exists. If the god as defined can not *logically* exist. It doesn't. Certain concepts, like a flat cube or a 5-sided square have contradictory attributes. So, they can't, so thus don't, exist.

The internal attributes of the Christian God, can be contradictory, which would void at least one of them which could void the God's existence. At least one of God's claimed attributes of omnipotence, benevolence, and omniscience is logically contradicted by the fact of innocents suffering of the "Omnipotence paradoxes" including the *Problem of Suffering / Evil*, as described at AD 414,

Popper also said that no other thought has been so powerful in the moral development of humans than separating the individual from the crowd. Like **Hume**, **Popper** opposed using induction altogether.

He said "conjecture and refutation" are key to the scientific method. (more **Popper** 1945).

1934 Physics: **Marie Curie's** (ref 1897) daughter, **Irene**, and her husband, **Frederic Joliot**, said they had bombarded elements with alpha particles (2 protons) and had induced radiation in the elements.

1934 Physics, atomic power: **Enrico Fermi** (1901-54), Italian, suggested that neutrons and protons are the same fundamental particles in two different quantum states. He discovered neutron induced radioactivity in 22 elements. He also formulated a theory of the weak nuclear force that predicted a new particle, the neutrino. **Leo Szilard** (1898-1964), Hungarian physicist in America, said If one hit an atom with a neutron, and it broke up and released two, one would have a chain reaction.

1934 Political Theory, fascism in England. A British fascist political party formed in 1932 became the British Union in 1937. It met with some popular support, claiming 50,000 members at one point.

Harold Harmsworth, Viscount **Rothermere**, owner of *The Daily Mail*, England's largest newspaper and 14 other national dailies, was a friend and admirer of **Hitler** and **Mussolini**. He had his papers write favorable articles about them. He said, "**Mussolini** will probably dominate the history of the 20th century as **Napoleon** dominated that of the early 19th century.

He is the greatest figure of the age." Under **Rothermere**, the *Daily Mail* was the most friendly paper to be friendly with Nazis It encouraged public support for England's appeasement policy.

Martin Pugh, Brit, historian of fascism, wrote that **Rothermere** was "perhaps the most influential single propagandist for fascism between the wars. This is detailed in **Kathryn Olmsted's** book, *The Newspaper Axis: Six Press Barons Who Enabled Hitler*.

Press Lord Wm. Hearst admired **Hitler** and fascism. Political Theory, fascism in America: **William Randolph Hearst** (1863-1951, ref 1900, '13), the most powerful newspaper owner in America (with 28 newspapers nationwide) admired **Hitler**.

He visited Germany, met **Hitler**. Hearst reportedly agreed to assist **Hitler** for \$400,000 per year.

Göbbels signed the agreement. **Hearst** told his reporters to write only favorable stories about **Hitler**, the Nazis **Göring**, **Göbbels**, **Mussolini** and other dictators in Europe and Latin America.

Hearst personal statement for Germany

His newspapers published his personal statement supporting Germany: "The struggle of Germany for liberation from the iniquities of the *Versailles Treaty*, and for freedom from the malignant oppression and compression of nations which are selfishly but shortsightedly hostile to her progress, is a struggle which should be watched with sympathetic interest by all liberty-loving people everywhere."

"**America First**" Political Theory, patriotism: **Hearst's** newspapers' mastheads had the patriotic slogan, "**AMERICA FIRST**, An American newspaper for the American people." (More **Hearst** 1939, '41, '54)

"American businesses had extensive business dealings with **Hitler** during his rise of German militarism during the war including JP Morgan, Chase Bank, GM, Ford, IBM, and Eastman Kodak.

Huey Long, Louisiana governor, said, "If fascism comes to America, it would be on a program of Americanism.

1935 Thermodynamics, the Fourth Law of Thermodynamics, the Zeroth law: was discovered. Namely: "Two bodies with the same temperature as a third body have the same temperature."

Physics: **Einstein** and others sought a *Unified Field Theory* to unite gravity and electromagnetism, two then-known fundamental forces. Soon, two new fundamental forces were found, the strong nuclear force and the weak nuclear force. The strong nuclear force keeps the protons and neutrons in atoms' nuclei together (but reaches out only 1/100, 000 the diameter of the atom). The weak nuclear force is 10BBB times stronger than gravity and controls certain kinds of radioactivity. (see 1950)

The problem of Germany **Schuman** (ref. 1532, 1750) The problem of Germany's role between Russia and the Western Powers was the most crucial single problem of European politics from the time of **Frederick the Great**.,

1935 The Saarland had a plebiscite in January, giving control to **Hitler**. In March **Hitler** remilitarized the Rheinland, demilitarized by the *Versailles Treaty*. Neither England nor France reacted.

Propaganda Keep it simple. Appeal to Political Theory, fascism: **Joseph Goebbels** (1897-1945, ref.1934), said, "Christ cannot possibly have been a Jew. I don't have to prove that scientifically. It is a fact." His diaries also described **Hitler's** technique in speaking to the German people. "Avoid abstract ideas, appeal to the emotions.

emotions.
Repeat it.
It will help
us conquer
the world.

Continually repeat just a few ideas. Give only your side of the argument. Continuously criticize your opponents.” In September 1936, **Goebbels** told a huge (150,000) *Rally for Honor* at the fourth annual Nazi Congress, “Propaganda helped us to power. Propaganda kept us in power. Propaganda will help us conquer the world.” To dehumanize Jews and to make them easier to hate, **Hitler** called Jews *vermin*. In Italy, **Mussolini** told **Pius 11** to call his genocidal invasion of Ethiopia a “holy war”.

Henry
Luce:
Fascism
may be the
inspiration
for the next
generation
of mankind.

American fascism: Henry Luce (1898-1967, ref.1923, ‘28), owner of *Time* and *Fortune* magazines, devoted one entire issue of *Fortune* to praising **Mussolini**. **Luce** put **Hitler** on the cover of *Time*, the U S’s most influential news magazine, several times and **Mussolini** six times, once just to celebrate **Mussolini’s** birthday. **Luce** put **Charles Coughlin**, a vicious anti- Semitic Catholic priest with a large radio following on *Time’s* cover in 1934.

Luce said, “The moral force of fascism . . . may be the inspiration for the next generation of Mankind.” *Time* was the largest and most influential magazine in America. One cannot minimize the influence on public opinion of **William. Randolph Hearst** and **Henry Luce** in the era before TV. **Hearst’s** nationwide papers in the 1930s had a circulation of 20 million, 25 times larger than the nations largest paper, The NY Times. **Luce’s** biographer, **Robert Edwin**, called him “the most influential private citizen in the America of his day.”

Hearst and **Luce** were not the only U S press lords to admire fascism. **Joseph Patterson**, owned the New York *Daily News*, which was to become America’s largest circulation newspaper. *The Daily News* was one of the first newspapers to congratulate **Mussolini** editorially. “Coronel” **Robert McCormick** of the *Chicago Tribune* was also an admirer of **Mussolini**.

1936
Fascism in
America

Political Theory, fascism in America: Anti-Semitism was widespread in America as well as in Germany. Playing on American anti-Semitism, Germany secretly subsidized organizations in America to promote friendly relations with Germany. **Bradley Hart’s** book, *Hitler’s American Friends* and **Charles Higham’s** *Trading with the Enemy* documented how American businessmen assisted **Hitler**.

The *German American Bund* was founded to promote American fascism and create a counterpart to the German Nazi Party. It was openly anti-Semitic. It called **Roosevelt’s** “New Deal” the “Jew Deal”. The *Bund* used American patriotic slogans.

Hitler repeated his lies about Jews constantly. People came to believe him. Americans of all classes admired **Hitler**, including former Republican president, **Herbert Hoover** and **Charles Lindbergh** (1902-74), America’s aviation hero and popular celebrity. **Lindbergh** and his wife visited Germany and were treated like nobility. They attended the Summer Olympics in Berlin.

There the American Black athletes disproportionately won the most medals, **Jesse Owens** won four golds. After returning home, President **Roosevelt** invited the white American athletes to the White House, not the Blacks. FDR feared the wrath of Southern racist senators. **Owens** said, “**Hitler** didn’t snub me, it was [**Roosevelt**] who snubbed me. The president didn’t even send me a telegram.”

Who is a true
conservative?

Political Theory, democracy: President **Roosevelt** (1882-1945) pointed out the difference between **Edmund Burke** conservatives and authoritarians who called themselves conservatives. “The true conservative seeks to protect the system of private property free enterprise by correcting such injustices and inequalities as arise from it. The most serious threat to our institutions comes from those who refuse to face the need for change.

Liberalism is the protection for far sighted conservatives.” Many white Christian clergy opposed Roosevelt’s social programs for taking the churches’ role in charity.

1936 Economics: Lord **John Maynard Keynes** (1883-1946) (ref 1919) a most influential economist and philosopher published. *History of The General Theory of Employment, Interest, and Money*.

It fundamentally changed the theory and practice of macroeconomics. He said the gold standard was “a barbarous relic.” It presented a groundbreaking theory that challenged classical economics, asserting that aggregate demand, driven by public and private sector spending, is the primary factor influencing economic activity and employment levels.

The book also introduced the concept of fiscal and monetary policies as tools to manage economic downturns, thus shaping the foundation of modern macroeconomics. He said that the financial markets needed government intervention and regulation, including printing money for public works to fight unemployment during economic slumps. He said that the market is not “efficient,” as free marketers say, as short term speculation distorts it.

Keynes
Quotes

“When the capital development of a country becomes a by-product of the activities of a casino [Wall Street], the job is likely to be ill-done . . . The engine which drives enterprise is not thrift, but profit.” “The ideas of economists [right or wrong] are more powerful than is generally understood. Indeed, the world is ruled by little else.”

Economic

“Practical men who believe themselves exempt from any intellectual influences, are usually

- theories rule the world** the slaves of some defunct economist. I do not know what makes a man more conservative- to know nothing but the present, or nothing but the past." "Madmen in authority, who hear voices in the air, are distilling their frenzy from some ancient academic scribbler." "The power of vested interests is vastly exaggerated compared to the gradual encroachment of ideas."
- 1936 A-J Ayer, Logical Positivism** Philosophy: Sir **Alfred-Jules Ayer** (1910-89), Brit, in *Language, Truth and Logic*, articulated logical positivism, developed by a group of Viennese and German mathematician / philosophers influenced by **Wittgenstein** (ref 1922), skeptical of theology and philosophy. Logical positivists rejected **Kant's** belief that innate capabilities in the brain enable Man to understand phenomena, i.e., *a priori* knowledge. **Ayer** as an analyst was not concerned with the physical properties of things, but only with how we speak about them. Positivism marked the end of *Romanticism*.
- A-J Ayer: Words need precise definitions to be meaningful** "Scientists can speak meaningfully as the words they use have specific meanings and can be proven or disproved by experiment, observation, and measurement." "Philosophers and theologians can't speak meaningfully as the words they use have different meanings to different people." "To say 'God exists' is just a metaphysical utterance which cannot be either true or false as it can't be verified or falsified." This starkly illustrates the need for precise definitions as whether God exists or not depends on the definition of God. **Michael Shermer**, "Semantic precision is a core component of science." **Ayer** said, "Similarly, no sentence which purports to describe the *nature* of a transcendent god can be literally significant as the attributes claimed for the God or gods can not be verified."
- White Supremacy** **Margaret Mitchell's** book & movie, *Gone with the Wind*, popularized White Supremacy. It rewrote history to make slave owners heroes & abolitionists as destructive interlopers engaged in "Northern Aggression." Philosophy: **Max Planck**, "Previously, science and philosophy were alien, if not antagonistic. No longer."
- 1936 Psychology**: **Claire Booth Luce**, American, journalist. "Fifty years [**Freud**] spends analyzing women And he still can't find out what they want. So this makes him the world's greatest on female psychology?"
- 1936-37 Fascism in Spain**: **Francisco Franco**, a Spanish general led rebellious forces against the liberal Spanish royalist government. All the European powers signed a Non-Intervention Agreement, helping **Franco**. Fascist Germany and Italy ignored the agreement and sent massive aid to **Franco**. **Hitler** sent the German *Luftwaffe*. It destroyed Guernica, the center of Basque resistance to **Franco**. German planes and Italian troops (est. 100,000-200,000) were the decisive factor in Franco's victory. **Hitler's Luftwaffe** chief **Göring** wanted every German air squadron have an actual war experience.
- Picasso's Guernica. An isolationist US Congress passed the Neutrality Act** All major US newspapers and the Catholic Church supported **Franco**, called the royalists "reds." Every "civilized" democracy in the world except Mexico turned against a fellow democracy, the Republic of Spain, or did nothing. England declared neutrality, preventing aid to the royalist government. The US Congress passed a *Neutrality Act* to prevent aid to the royalists. The world famous artist, **Pablo Picasso**, painted *Guernica*, the most famous anti-war painting of all time. The literary community was overwhelmingly for the Royalists including **Theodore Dreiser**, **Sinclair Lewis**, and **Andre Malroux**. Some Americans volunteered and fought **Franco**, the **Abraham Lincoln** Brigade.
- 1937 Aldous Huxley Quotes** **Aldous Huxley** (ref 1932) "So long as men worship the **Caesars** and **Napoleons**, **Caesars** and **Napoleons** will duly rise and make them miserable." "The old idea that words possess magical powers is false, but words *can have* a magical effect - but not in the way that magicians supposed, and not on the objects they were trying to influence. Words are magical how they affect the minds of those who speak them." "Words can mould men's thinking, to canalize their feeling, to direct their willing and acting and cannot justify the means for the simple . . . reason that the means employed determine the nature of the ends produced."
- The means determine the ends.**
- Luckily, most Christians don't take Christian ideals seriously.** "The vast majority of human beings dislike and actually dread all notions with which they are not familiar . . . Hence . . . innovators have generally been persecuted and always derided as fools and madmen." "Luckily the majority of nominal Christians has at no time taken the the Christian ideal very seriously; if it had, the races and the civilization of the West would long ago have come to an end." "The only cure for science is more science, not less. We are suffering from the effects of a little science badly applied. The remedy is a lot of science, well applied."
- 1937 Mussolini scammed the clergy** Political Theory, fascism: **Pius 11** protested against **Hitler's** suppression of Catholic newspapers and organizations. **Mussolini** bragged to the German Foreign Minister how easily he had manipulated **Pius 11**. He allowed religious education in schools and gave the high clergy tax concessions & railway passes. **Ernest Hemingway**: "Fascism is a lie told by bullies." (More 1946)
- 1937 Law**: **Benjamin Cardozo** (1870-1938) Supreme Court Justice. "Property, like liberty, though immune under the *Constitution* from destruction, is not immune from regulation essential for

the common good. What the regulation shall be, every generation must work out for itself."

Current
education
system is
outdated

Education: H G Wells (ref. 1902, '14-19), "We are living in 1937 and our universities. . . are not half-way out of the 15th century. We have made hardly any changes in our conception of university organization, education, graduation, for several centuries. The three or four years' course of lectures, the bachelor who knows some, the master who knows most, the doctor who knows all, are ideas that have come down unimpaired from the Middle Ages. No one should end his learning while he lives and these university degrees are preposterous.

The
government
is best that
provides
the most.

Political Theory: Walter Lippmann (1889-1974), most influential journalist of the 20th century, wrote *The Good Society*, (1937) "great impersonal corporations are public properties privately controlled and they have to be reduced to genuinely private properties or publicly controlled."
"It is perfectly true that the government is best that governs least (**Jefferson**). But, It is equally true that the government is best that provides the most." "The responsibility for insurrections rests in the last analysis upon the unimaginative greed & endless stupidity of the dominant classes."

Lippmann
Quotes

Capitalism: "Those who deplore the use of force in a labor struggle should ask themselves whether the ruling class of any country could be depended upon to inaugurate a program of reconstruction which would abolish the barbarism that prevails in industry."

Whoever
seeks to set
one race
against
another seeks
to enslave all
races."

Political Theory, democracy: Franklin Roosevelt, "Democracy alone, of all forms of government, enlists the full force of men's enlightened will. It is the most humane, the most advanced and, in the end, the most unconquerable of all forms of human society." "Concentration of power in all-embracing corporations. . . represents. . . a kind of private government which is a power into itself—a regimentation of other peoples money and other people's lives." He spoke to the very conservative (and white) Daughters of the American Revolution, he said, "Remember that all of us, and you and I especially, are descended from immigrants and revolutionists."

1938
What is
philosophy
See many
views in the
Index

Philosophy: Will Durant, *The Story of Philosophy*, "Every science begins as philosophy and ends as art. It arises in hypothesis and flows into achievement. Philosophy is a hypothetical interpretation of the unknown (as in metaphysics), or of the inexactly known (as in ethics or political philosophy).
Science is the front line in the siege of truth. Science is the captured territory and behind it are those secure regions in which knowledge and art build our imperfect and marvelous world.

Germany
gave high
awards to
Ford and
Lindbergh

Political Theory, fascism: Hitler militarized the German economy, built an army and air force.
In March, he annexed Austria. **Charles Lindbergh** (ref 1935) visited Germany several times and was treated as a hero. **Hermann Göring**, **Hitler's Luftwaffe** chief, showed him the German Air Force and awarded him the *Commander's Cross of the Order of the German Eagle*, the same award that **Hitler** gave **Henry Ford**. **Ford's** factories built cars and trucks for **Hitler's** army.

Killing for God: Hitler speaking in the Reichstag, said, "I believe that I am today acting in the sense of the Almighty Creator. By defending myself against the Jews, I am fighting for the Lord. On Nov. 9, Nazi and others destroyed or damaged 267 synagogues and 7000 Jewish businesses.

A master
race.
Educate
women for
motherhood

Hitler wanted to produce a master race through selective mating and killing persons with undesirable traits. **Hitler's** "scientists" went beyond simple selective mating and made eugenics a pariah science (Farmers/ ranchers routinely use selective breeding to make their livestock more valuable.). **Hitler** said, "Female education is for motherhood." Women with 4-5 children got a bronze *Mutter's Kreutz/Mothers Cross* medal, silver for 6-7, gold for 8 or more.

Different
structured
languages
affect how
one sees the
world

Linguistics: Ed Sapir and Ben Whorf: American anthropologist linguists, Cultures whose languages are structured differently see the world differently. **Stuart Chase's** (1888-1985) *Tyranny of Words* showed there was little agreement on the meaning of most philosophical or political words. "Much of what we argue about is really not an argument about facts but about definitions. Most political commentary is limited to 120 vague and ambiguous code words.
If you let an adversary select the terms of an argument, he has already won." *The Internet Encyclopedia of Philosophy*, "No problems of knowledge are less settled than those of definition."

Stone Age

50,000 Stone Age people were discovered in the Grand Valley in remote mountainous Papua New Guinea.

1938
England,
France, and
Italy agree:
Hitler can
occupy the
Sudetenland

Political Theory, fascism: In September, English PM **Neville Chamberlin**, flew to Munich to meet with **Hitler**. He asked **Hitler** if there were anything after the Rheinland and Austria he wanted. **Hitler** suggested the Sudetenland, the German speaking part of Czechoslovakia. **Chamberlin**, with the French and Italian governments, agreed that **Hitler** could take the Sudetenland (which he immediately did) in exchange for a promise of peace. The allies acted as they saw **Hitler** as an enemy of communism. **Chamberlin** also thought it would keep **Hitler** from invading England.

1939-99 World War 2-Atom Bomb Paradigms Cold War Anthropic

1939 Chemistry: **Linus Pauling** (1901-94), eminent chemist, published *The Nature of the Chemical Bond* (It has been cited over 16,000 times in scientific papers). All told, he wrote over 1,200 papers. Building on **Langmuir** (ref. 1919, '23), he introduced the concept of *orbital hybridization* and explained the difference between *ionic bonding* and *covalent bonding* of atoms.

Covalent bonding Covalent bonding. Recall, electrons orbit an atom's nucleus in orbits which are at specific distances from the tiny nucleus. These specific distances are called "shells." The shells are not physical shells.

They are just specific distances. (1913-**Bohr**). When an atom's outer orbital shell (called the valence shell) has a capacity of 2 or 4 or 8 electrons, the element is stable/inert and, like gold, does not bond with other elements. (1916-**Gilbert Lewis**, 1919-**Bohr**).

The bond: An atom of Element A bonds with an atom of Element B (or Elements B and C) by connecting their valence shells so that each element's valence shell shares the stable number of electrons for their valence shell, making molecules of Substance AB (or Substance ABC). The shell closest to the nucleus of atoms is stable with two electrons. Other shells are stable with 4 or 8 electrons.

Atoms whose valence shell has one or two electrons are easiest to bond with other atoms.

Ionic bonding Ionic bonding is the transfer of electrons from a metal element to a non-metal element to obtain a proper number for that shell. It is a type of chemical bonding that involves the electrostatic attraction between oppositely charged ions, and is the primary interaction occurring in ionic compounds (ref. 1913-Chemistry, Physics and 1916-Chemistry). **Pauling** was the father of molecular biology. He most importantly applied quantum theory to chemistry. (He won the 1954 **Nobel Prize** in chemistry, and then as an advocate for peace, the 1962 **Nobel Prize** in peace).

1939 Political Theory, fascism in England: The fascist British Union's embrace of Nazi-style anti-semitism led to confrontations with anti-fascists. Growing British hostility towards Nazi Germany caused the party to decline. It folded in 1940 when England went to war with Germany.

Germany rearmed Political Theory, fascism: As predicted by **Schuman** (ref. 1532, 1750, 1935), on March 15, without a fight, **Hitler** occupied the remaining Czech provinces of Bohemia and Moravia. The rest of Western Europe did nothing. **Pius 9** said, "Blinded by their dreams of worldly gain and material success, [Jews deserved] "worldly and spiritual ruin." **Pius 11** died. **Pacelli** became **Pius 12**. He publicly praised **Mussolini** and decreed that Communist Catholics be excommunicated. The Vatican was neutral for WW2.

Pius 9: Jews worldly ruin

Alain Philosophy: **Alain**, pen name of **Émile-Auguste Chartier** (1868-1951), influential French philosopher, "Nothing is more dangerous than an idea when it is the only one we have."

Sean O'Casey (1880-1964), "No litany, Catholic, Protestant, or Baptist, has a petition for a sense of humor." **W H Auden** said the 1930s were the "low dishonest decade"- a time that bred uncertainty and conflict.

Steinbeck Literature, philosophy: **John Steinbeck**: (1902-68), American author, published *The Grapes of Wrath*, a novel about the Joad family, victims of the the Depression driving from the Oklahoma Dust Bowl to find a job in California. The old folk die. The rest go to migrant labor camps where the poor help one another to survive. . . At a migrant worker camp, quoting a camp manager, "A red is any son-of-a-bitch who wants 30 cents an hour when we're paying 25." It is a harsh indictment of capitalism

The Grapes of Wrath The hardships the Joads endure are beyond description, including those done by the cruel deputies of the law. Their pregnant teen aged daughter is abandoned by her husband and she gives birth to a stillborn baby. A laborer tells them, "I guess we're all, or most of us, the wards of that nineteenth-century science which denied existence to anything it could not measure or explain. The things we couldn't explain went right on but surely not with our blessing." "I'm learnin' one thing good. Learnin' it all the time. If you're in trouble, or hurt, or need, go to the poor people. They're the only ones that'll help-the only ones."

When in trouble, go to the poor

Grapes of Wrath won the **Pulitzer prize** and in 1962 the Nobel Prize in Literature for realistic and imaginative writings, combining sympathetic humour and keen social perception."

1939 **How sunlight is made** Physics: **Hans Bethe** (ref. 1936) and **Charles Critchfield** (1910-94) explained sunlight. Specifically: 1. Two pairs of hydrogen atoms fuse, forming two deuterons (a hydrogen isotope of one proton but also has one neutron), which then immediately fuses with an additional proton to form *helium3*

(two protons + three neutrons), an isotope of helium, ³He. Then these two ³He nuclei fuse to become beryllium-6, but this is unstable and disintegrates into two free protons and the normal ⁴He. This reaction also releases two neutrinos, two positrons and gamma rays.

This lost mass is sunlight / energy that then migrates *extremely* slowly to the surface of the Sun and then radiates into space at the speed of all electromagnetic waves, c.186,282 mps (299,792+ Kps).

**The Sun
burns for
billions of
years**

So the Sun burns for billions of years without burning up entirely. Heavier elements are created by *fusion*. **Bethe** won the 1927 Physics Nobel for this. He produced major works into his 90s.

Over 74% of the atoms in the universe are hydrogen; helium atoms are 24%.

(Only three of the naturally occurring elements were created shortly after the big bang. Hydrogen, helium and a trace of lithium. The rest were forged in the high-temperature hearts and explosive remains of dying stars, enabling subsequent generations of star systems to incorporate this enrichment, forming planets and, in our case, living organisms like bacteria and people.

1939 Physics, atom bomb: On August 2, at the urging of **Leo Szilard**, fellow physicist **Einstein** wrote President **Roosevelt** about the potential power of an atom bomb and reports that Germany was working to develop one. **Roosevelt** soon authorized a secret atomic bomb project.

Enrico Fermi (ref. 1934) who had escaped **Mussolini** in 1938, then in Chicago, caused a controlled nuclear chain reaction. He joined the American atom bomb project.

**Germany
invaded
Poland,**

Political Theory, fascism: On Sept. 1, Germany invaded Poland. This time England and France didn't acquiesce. They declared war. France and most other continental European countries quickly fell to German forces. The US stayed out of the war. Germany secretly financed a huge propaganda program in the US to keep the US from helping the countries overrun by Germany, even to using the franking privileges of co-operating Congressmen, to send fascist propaganda literature nationwide.

**German
propaganda
in America**

**Hearst and
Christians
still
favored
fascism**

Two of the most popular Nazi organizations were the *Christian Front* and the *Christian Mobilizers*. Their radio programs spread hatred to millions. Plus, Catholic priest **Charles Coughlin**, an extreme anti-Semite had a huge radio audience extolling fascism. **Hearst's** (ref. 1934) newspapers still editorialized against helping England.

But **Roosevelt** sold and "lent" war materials to England, including naval destroyers. Japan had been fighting China for two years. Anti-Semitism was widespread in the US. A majority of Americans thought that the German Jews were themselves responsible for **Hitler's** persecutions. The U.S. and Canada turned away the M.S. St. Louis, which carried nearly 1,000 Jewish refugees. The ship was forced to return to Europe, where hundreds of the passengers were killed by the Germans. A German diplomat in Washington told an American fascist that the US had probably ten times more anti-Semitism than Germany when **Hitler** took over.

**Carbon
dating**

Physical chemistry: Willard Libby, Univ. of Chicago, discovered that an isotope of carbon, Carbon 14, decays into Carbon 12 by one half each c5,600 years. So determining how much Carbon 14 is in a piece of carbon determines when the organism died. This is radioactive carbon dating. It lets one to determine how long ago a carbon substance existed. It's accurate up to c.40,000 years. **Libby**-physics **Nobel** 1960.

**"America
First"
Committee,
(the credo of
the Ku Klux
Klan)**

1940 Political Theory, fascism: In February, in a speech, **Hitler** said that fascism has one strong new idea to carry new strength which would make Germany great again. He said, referring to Jews, "Surely I have the right to remove millions of an inferior race that breeds like vermin."

In the US, *The America First Committee*, another anti-Semitic and pro-fascist organization, was founded to influence America not to help England and its allies overrun by Germany. It was the largest organization in America against helping the Allies. Its leader was **Charles Lindbergh** (ref 1935, '36, '38), America's aviation hero and an anti-Semite. Former Republican US president **Herbert Hoover** was also a leader of the Committee. In a speech, **Hoover** praised **Hitler** as a force for stability in central Europe.

**This land is
your land**

Political Theory, anti-fascism in America: Liberal and anti-fascist organizations wanted the US to help England and the countries **Hitler** overran. **Woody Guthrie** (1912-67), a left-wing laborer and folk singer, wrote *This Land is Your Land* to support England. It has become a classic. (**Bruce Springsteen** and **Pete Seeger** sang it at President **Obama's** inauguration. lyrics p. 471)

1940 Anti-fascism: **Ernest Hemingway** strongly criticized **Hitler** and **Mussolini** when he published *For Whom the Bell Tolls*, based on **John Donne**, "Each man's diminishes me. For I am involved in mankind. Ask not to know for whom the bell tolls. It tolls for thee."

Hemingway's lesson, When fascism is ascendant, each man must take a stand.

Philosophy: Leon Trotsky (1879-1940), an exiled Russian revolutionary wrote *Their Morals and Ours*, "The end may justify the means only if there is something that justifies the end." "Not believing in force is the same as not believing in gravity." **Stalin** had him assassinated in Mexico.

1940 Racial discrimination, America: **Richard Wright** (1908-60) living in mostly Black South Chicago, published *Native Son*, one of the earliest and most successful books on the harsh realities

of Negro life in the US. He wrote voluminously, often for left-wing publications. He got awards for his writings. (In 1946, he moved permanently to Paris and wrote on racial matters.)

1940 **C S Lewis, *The Problem of Pain* is atheism's most potent weapon against the Christian faith.** Christianity defended: **C S Lewis** (1898-1963), a professor of literature at Oxford and Cambridge, was best known for writing *The Chronicles of Narnia*, fairy tales. He became a popular Christian writer, said. "The problem of pain is atheism's most potent weapon against the Christian faith. This is generally accepted.) He published *The Problem of Pain*, *The intellectual problem raised by Human Suffering with Sympathy and Realism*. He argued that human (and animal) suffering and hell are not reasons to reject belief in God. His early three principal arguments for God were:

1. *The Argument from Desire* (God is the ultimate object of human desire, so it must exist),
2. *Moral Argument* (God is The the power behind moral law who guarantees the objectivity of moral judgments)
3. *The Argument from Reason* (God is the cosmic mind that guarantees the objectivity of logical inference.)

For reason, one needs little more than a knowledge of, add, subtract, multiply, and divide. He said his years as an atheist were a time of futility, darkness, doubt, and that he dabbled in occultism as an atheist. (This is implausible as occultism is a supernatural belief system, which atheists disdain.

Answer to the Problem of Suffering **Lewis** answered *The Problem of Suffering/Evil*: He phrased the *problem* as, "If God were good, He would make His creatures perfectly happy, and if He were almighty He would be able to do what he wished. But the creatures are not happy. Therefore God lacks either goodness, or power, or both."

Lewis's straw argument. This misstates the *Problem of Evil/Suffering*. (**Stuart Chase**, "If you let an enemy select the terms of the argument, he has already won. ") First, like many proposed answers, he *assumes* God exists, i.e., he used God to prove God. Second. He said people want to be "perfectly happy."
This falsely infers that people are selfish, unworthy. But, people just don't want to *suffer*. Many people historically have accurately and fairly phrased the problem. (See pp. 407-410)

1940 **Lewis** posited several answers to the *Problem of Suffering/Evil* as he posed it. All his proposed answers *assumed*, not *proved* a God, and proposed reasons why it was okay that people suffer. (Such arguments don't work with Jews.)

The Free Will Defense is refuted by many scholars His principal argument was the *Free Will Defense*, not an argument for God per se, but a proposed possible (not even likely) circumstance that may allow a God to co-exist with innocents suffering. He said also God gave humans *free will* and such gift was so great that it outweighed the suffering that God knew people with free will would cause. As detailed at 1710, comparing *free will* with *suffering* is meaningless as a category error. The existence of *free will* itself has been denied by many scholars (see pp. 196-198). The *Free Will Defense* itself had been refuted by **Augustine** (AD 413), **Pierre Bayle** (1697), **David Hume** (1751), and as we will see was refuted by **Karl Popper** (1945), **J L Mackie** (1955), **Andrea Weisberger** (1995), **Niclas Berggren** (1996), **Raymond Bradley** (2007), **Sean Meslar** (2014), **Richard Davis** and **W Paul Franks** (2018).

Lewis says if God prevented suffering, it would negate the evil-doers' free will **Lewis** also asserted that God does not interfere when someone exercising his *free will* is causing an innocent to suffer because, "If you choose to say, God can give a creature *free* and at the same time withhold *free will* from it, you have not succeeded in saying anything about God."
But, what **Lewis** was actually saying is that his God can't distinguish between a reasonable and justifiable trivial restriction on free will and a complete total ban. And that his God couldn't tell the difference between insignificant irrelevant "suffering" and the Holocaust.

He is also saying that his God isn't omnipotent as he couldn't give humans free will *except* to cause suffering. We have seen that God could and did say to Adam, "Eat from any tree *except* the tree of knowledge.

If God doesn't interfere, He is simply giving free will to whoever is the strongest. **Karl Popper** (ref. pp 1927, '33) made a similar argument.

Claiming there are only two choices is a logical fallacy of a false dilemma when there are other reasonable choices. To restrict someone's *free will* in a trivial way is just that, trivial and so, irrelevant.

Lewis's argument talks about "evil." **Lewis**, has argued (here greatly simplified), "The *Problem of Evil* requires transcendent universal objective moral laws for evil to exist to violate those laws. Transcendent moral laws require a transcendent moral lawmaker-God. If no God, no transcendent moral lawmaker. If no lawmaker, no moral laws. If no moral laws to break, no evil." Such complex roundabout wordplay arguments dependent on "evil" are irrelevant when one understands that the problem is suffering, not evil. We assert evil is irrelevant to the *Problem of Evil*;

Should it make any difference to a loving God Should it really make any difference to a loving God what causes needless or gratuitous suffering to innocents? Of course not. We have seen the first (known) example of the problem, was the Sumerian *Poem of the Righteous Sufferer*. Evil was not involved. Then in the *Hebrew Bible*, the

- what causes suffering?** same theme, an innocent suffering was repeated in the Book of Job. "Evil" was not an issue in the story of Job. It was simply Job's needless suffering. The *Hebrew Bible* in the *Psalms* has other verses with similar themes. Then the *New Testament* describes its God as omnipotent, benevolent and omniscient, the problem becomes a Christian problem. Evil is not involved. So the *problem* is more simply, accurately, and rationally named and analyzed as a *Problem of Suffering*, not a *Problem of Evil*, even though both names refer to the same problem. Remember, the *Problem* is not a theology problem. It is not a philosophy problem. It is a deductive logic problem.
- Free will makes love or joy worth having** **Lewis** also argued that *free will* is the only thing that makes love or joy or goodness worth having. This is questionable speculation. What makes love or joy worth having differs among people. But he knew? **Lewis** also argued that God had a deep overriding purpose behind man's sufferings and that God used pain as a teacher. So pain is OK? He knew the motives of an unknowable God?
- Lewis** **Lewis** accepted *Original Sin*, inherited sinfulness, so his omniscient God knew Adam would sin which would bring evil into the world and He created Adam anyway. This makes God complicit in all sin. (**Spinoza**)
- Another **Lewis** answer to the *Problem of Suffering* was the *Humans-have-limited-ability* argument. He said, "As God is wiser than we, His judgments must differ from ours on many things, and not least on good and evil. . . Like Job, we should acknowledge the limits of human wisdom and not presume to fully fathom why God permits suffering and evil. "What seems to us good may not be good in God's eyes, and what seems to us evil may not be evil in God's eyes."
- 1940 This fails. First, it *assumes* a God. Second, it makes no sense if we substitute a more specific phrase, like *excruciating torture to death* for the words *suffering* or *evil*. Namely, "What seems to us as *deathly excruciating torture* may not be *evil* or *suffering* in God's eyes." In other words, a benevolent God made humans too dumb to know why they suffer.
- How can a pious man know how to act?** **Hume** had answered the *humans-limited-ability* argument in 1751. He then said, "Saying evil is good is nonsense. This is contrary to human experience. The distinction between good and evil depends on the human mind. And, if God can justify an evil for a reason incomprehensible to Man, what can the most moral religious man know what God wants?"
- 1940 **Lewis** also felt that the doctrine of Hell was intolerable, but that it could be shown to be moral by critiquing the objections made against it. But things are good or bad irrespective of peoples' opinions. **Lewis** He also said that Hell is not as bad as the *Bible* says. He knew? How? One cannot choose what parts to believe. *The Bible* is clear. Hell is hell. Hell is irrelevant re God's existence in any case.
- Maybe we were made for another world** **Lewis** was loaded with weak arguments. His most useless argument, "If we find ourselves with a desire that nothing in this world can satisfy, the most probable explanation is that we were made for another world. How is this relevant to people's suffering. His God made us here. **Lewis** did admit that Christianity seeks to induce guilt, and thrives on it. (more 1944), '47-48, '83) (In 1985, philosopher **John Beversluis** (1934-2021) refuted **Lewis's** arguments.
- 1941 Religion, fascism, Christian silence: When **Hitler** carried out anti-Church measures, the Catholic and Lutheran bishops remained loyal to him. The German Catholic Church supported **Hitler's** 1941 invasion of Russia as Russia was Godless communism.
- 1941 Political Theory, democracy, fascism: **Churchill** eloquently rallied the British people. In the U S, President **Roosevelt** saw European nations fall to **Hitler's** cruel regime. He wanted to rally public support for the US to oppose **Hitler** and move the nation away from its isolationism.
- Four Freedoms Speech** In his *State of the Union* address, **Roosevelt** gave his *Four Freedoms* speech. He said, "There is nothing mysterious about the foundations of a healthy and strong democracy. The basic things expected by our people of our political and economic systems are simple. They are: Equality of opportunity for youth and others. Jobs for those who can work. Security for those who need it. The ending of special privilege for the few. The preservation of civil liberties for all. The enjoyment of the fruits of scientific progress in a wider and constantly rising standard of living."
- Roosevelt** His four freedoms were: 1. *Freedom of speech and expression*. 2. *Freedom to worship God in one's own way*. 3. *Freedom from want*, and 4. *Freedom from fear*."
- 1941 **George Orwell** (ref.1532, 1880) Brit, wrote that liberals who decried imperialism were hypocrites as their standard of living depended on its continuance. (more **Orwell**, 1945, '49, p. 466)
- 1941 Political Theory: **Louis Brandeis**, Supreme Court Justice, "We can have democracy in this country or we can have great wealth concentrated in the hands of a few, but we can't have both."

Philosophy: **Theodore Dreiser** (1871-1945), American novelist, "All forms of dogmatic religion should go. The world did without them in the past and can do so again, I cite India and China."

- 1941 Political Theory, democracy: **Edward Dowling** (1898-1960), Jesuit priest, said, "The two greatest obstacles to democracy in the US are, first, the widespread delusion among the poor that we have a democracy, and second, the chronic terror among the rich lest we get it."

Virtually all Europe was under German control

Anti-Semitism, isolationism, fascism: During 1940-41, the *America First Committee*, founded by a Quaker Oats heir and student at Yale Law School held rallies around the US to discourage helping the European countries under **Hitler's** control using its patriotic slogan, *America First*. It had over 800,000 members in 450 chapters around the US. Its principal spokesman, **Charles Lindbergh**, spoke at huge rallies against U S entering the war in Europe or helping the Allies.

Virtually all Western Europe was under German control except Iberia, Switzerland, England and Ireland. **Hitler** was "defending himself" against the Jews by murdering millions.

1941 Charles Lindbergh threatened Jews

In September, **Lindbergh** spoke at a rally broadcast nationwide. He told his audience who to hate. He said, "three groups had conspired to draw the country into war: the British, Jews and the Roosevelt Administration." He warned Jewish groups in this country should realize that in the event of war they will be among the first to feel its consequences."

The next day, he said the Jews were using their large ownership and influence in our motion pictures, our press, our radio, and our government" to push the US into a disastrous war." New York mayor **Fiorello LaGuardia** called **Lindbergh's** speech "a carbon copy of a Nazi paper." On Oct. 30, 1941, **Lindbergh** delivered another *America First* speech at a large rally in Madison Square Garden.

Pearl Harbor 1941

Pearl Harbor: On December 7, Just five weeks after **Lindbergh's** Madison Square Garden rally, Japan, an ally of Germany, attacked the US naval base in Hawaii. **Roosevelt** called it "a day that will live in infamy." Within a day, Japan attacked the Philippines (a US territory), Indonesia (Dutch), Singapore, Burma, Hong Kong (all British), with an anti-colonial theme of Asia for Asians. The US went to war, not to stop **Hitler's** killings, but because Japan attacked it.

The US went to war

Fascism in America: **Lindbergh** cancelled a scheduled December 10 rally in Boston and quickly became a patriot. On December 11, **Hitler** foolishly declared war on the US, destroying America's fascist-friendly isolationist movement. The *America First Committee* disappeared.

Germany took over **Ford** and General Motors factories in Germany which had in any case been building **Hitler's** war vehicles. The US, with the world's biggest economy went to war. Its industries and troops mobilized. The US joined Russia, England, its colonies, and other Western European countries (*the Allies*) to defeat Germany, Italy, and Japan (*The Axis*).

J P Morgan & Co. ran a branch office throughout the war in Nazi-occupied France.

Henry Luce (ref. 1923, '28, 34) editorialized to promote an Anglo-American imperialist century not mentioning his earlier endorsement of fascism.

- 1942 Yellow Peril, paranoia: Fearing persons of Japanese descent would help Japan, the US interred 110,000 Japanese Americans who lived on the West Coast, 3/4 of whom were born in the US. Canada interred 22,000 Japanese Canadians and treated them worse than the US did its prisoners. In 1944, the Supreme Court approved it. The government hid FBI evidence showing no disloyalty.

- 1942 Philosophy: **Philip Wylie** (1902-71), a prolific American author and social critic, wrote *Generation of Vipers*. He severely ridiculed American businessmen, doctors, and especially "moms", with the realism of **de Toqueville**, **Sinclair**, and **Mencken**. He said the chief hypocrites of AD 30 were the businessmen and they are still tops. Any procedure that was technically legal, or could be made so to seem so became the businessman's definition of ethics, and, thus the public definition of morality. He said, "The Church has stood, a rock colossus of bigotry, in the path of 10,000 proposed reforms."

- 1943 Philosophy, existentialism: **Jean-Paul Sartre** (1905-80), French, in *Being and Nothingness*, articulated existentialism, an atheistic *attitude*, not a *philosophy*. "Man is alone, there is no blueprint of what he should be, no ultimate significance to the universe until he makes one for himself." That is, his *existence* precedes his *essence*.

"When a man builds something, he has its essence, its result, in mind, before he builds."

Existentialism Sartre Quotes

In his most read book, *Nausea*, he argued that if the world is accidental life is meaningless and nauseating. With **Sartre**, humans exist. From this they make their *essence*. **Sartre** denigrated humanist values because they assume a pre-existent human nature. He said, "When the rich wage war, it is the poor who die." "Man is condemned to be free. Man must make choices, which is the basis of his liberty. Moral decisions can only be made by Man and then only for himself."

- 1942 **There's no superior race** Philosophy: H G Wells, (ref 1902), "Suppose, now, there is such a thing as an all-round inferior race. Is that any reason why we should propose to preserve it forever? Whether there is a race so inferior I do not know, but certainly there is no race so superior as to be trusted with [deciding.]" "The true answer to **Aristotle's** "natural slaves" is that that there are no "natural masters."
- World War 2** Resistance to fascism: In 1942, **Hitler** demanded that the Finnish government deport to Germany all Jews in Finland. Finland was then occupied by German troops. The Finnish Government secretly decided not to surrender a single Jew, refugee or native. It never did. The Nazis did not retaliate. In September 1942, President **Roosevelt** sent **Myron Taylor**, a personal envoy to Pope **Pius 12** to ask him to publicly denounce the inhuman treatment of refugees and especially Jews in occupied countries. **Pius 12** kept silent. The Nazis knew "Money talks."
In 1943, Nazis arrested 2,000 Jewish husbands of Christian wives to send them to death camps. The German Christian churches said nothing. The wives and their friends protested for a week in downtown Berlin, standing in the snow. It was the only mass demonstration to save Jews. The BBC broadcast it. **Hitler** released the men.
- The hottest places in Hell are for those who stay neutral in a crisis.** These events do not prove but strongly suggest that if the German Catholic and Protestant high clergy with their organizational and presumed ethical power had protested publicly, they could have changed the course of history; they could have saved millions of lives. They preferred to continue getting money from **Hitler**. **Pius** stayed silent. **Dante** had said, "The hottest places in Hell are reserved for those who, in a time of great moral crisis, stay neutral." A few clergy did oppose **Hitler**, but the high clergy, with very rare exceptions, stated silent.
- 1943 **Life has no meaning** Philosophy: Joseph Campbell (1904-87) American mythologist, *The Power of Myth*, "Life has no meaning. You bring meaning to it (**Sartre**). Being alive is the meaning." This echoes existentialism. This is a nice sentiment for the well off, but, for billions, "being alive" is to find a scrap of food. They labor from dawn to dusk, day after day, month after month, year after year, til they die. He said, "God is a metaphor for a mystery that absolutely transcends all categories of human life. , It's as simple as that.
- 1944 **Huxley Quotes** **Aldous Huxley** (ref. 1932), "Religion, it seems to me, can survive only as a consciously accepted system of make-believe." "The more we know, the more fantastic the world becomes and the profounder the surrounding darkness." (More **Aldous Huxley** 1952, '58, 1990s).
- c.1944 **Penicillin made public** Medicine, penicillin came into common knowledge and use: How? Dr. **Alexander Fleming** (1881-1955) Scot, in 1928 discovered it, the first antibiotic. He grew it in his lab using mold and fungi. It killed harmful bacteria. He published his results. No notice was taken. Ten years later, **Howard Florey** and **Ernst Chain**, medical researchers, saw his article, replicated his procedures; it worked. It was then reserved for war casualties. In 1944 it was released to the general public. It protected people against many bacterial infections that were most probably fatal.
- 1944 **Harry Truman** Capitalism, economics: Harry Truman, then a senator, "Of course I believe in free enterprise, but in my system of free enterprise, the democratic principle is that there never was, never has been, never will be, room for the ruthless exploitation of the many for the benefit of the few." As senator, he became famous with investigations exposing corruption, and profiteering in the war effort. In July, he became **Roosevelt's** running mate for his fourth presidential campaign.
- 1944 **A second Bill of Rights** Political Theory: Roosevelt (ref. 1938-9, '41) proposed a "second Bill of Rights" to the *Constitution*. Such rights included the right to a job, to be paid enough to live comfortably; to "adequate food and clothing and recreation"; to start a business without worrying about "unfair competition and domination by monopolies; to a decent home; to adequate medical care to achieve and enjoy good health;"to government-based "protection from the economic fears of old age, sickness, accident, and unemployment"; and the right "to a good education." In November, he was reelected to a fourth term.
- Mere Christianity** Theology: C S Lewis's (ref.1940), *Mere Christianity* was voted best book of the 20th century by *Christianity Today*. He was widely praised for his wartime radio broadcasts to the British people.
- Lewis: Jesus was Lord, a liar, or a lunatic.** He is known for articulating an argument for God called the *trilemma*. This argument was known in Christian circles but was not important until **Lewis**. He wrote, "You must make your choice. Either this man was, and is, the Son of God, or else a madman or something worse. You can shut him up for a fool, you can spit at him and kill him as a demon or you can fall at his feet and call him Lord and God, but let us not come with any patronizing nonsense about his being a great human teacher. He has not left that open to us; he did not intend to. **Jesus** was either the Lord, a liar, or a lunatic, and his goodness eliminated liar or lunatic. So He was Lord." (See 1985, **Beverly** reply)

1944 **Lewis** also posited an *Argument from Morality* for God. Namely, we have a moral sense and a conscience which prove God exists; that there is a *law of human nature* different from the laws of nature, which, unlike natural laws, we can choose to disobey. Natural laws show us *how* matter acts.

His "*law of human nature*" is an ethical pronouncement, which believers and atheists can respect. Few would disagree with this, but he also says that without God, we could not act morally. But, billions of atheistic Jainists, Baha'i, Hindus, and Buddhists are as moral as Christians.

Lewis defended the Salem Christian witch burners on the grounds that they merely made a "mistake of fact" believing the burnt persons were evil, so it was moral to burn them.

Lewis responded to the Problem of Suffering

God's omnipotence: The *Bible* describes God as omnipotent without limit [created the universe].

Lewis however said God's omnipotence means only power to do all that is intrinsically possible [like creating the universe?], not to do the intrinsically impossible. "It remains true that all things are possible with God. You may attribute miracles to Him, but not nonsense," He said. God did not have the power to answer "How far is it from London Bridge to Christmas Day?" or "how far from yellow to Christmas?"

These **Lewis** examples are 1. straw arguments, 2. category errors (1710), and 3. disingenuous, as no proponent of *The Problem of Suffering* has ever used such nonsense arguments.

1944 Biology, DNA: After several decades of research by US and European scientists, **Oswald Avery, Colin MacLeod, and Maclyn McCarty**, Americans, showed that genes and hormones are determined by DNA. A DNA chromosome is a deoxyribonucleic acid molecule with part or all of the genetic material (genome) of an organism. Most eukaryotic chromosomes include packaging proteins which, aided by chaperone proteins, bind to and condense the DNA molecule to prevent it from becoming an unmanageable tangle.

How we think. Social status trumps economic factors

Economics: **Oskar Morgenstern** and **John von Neumann** posited a *utility theorem* of decision-making that said people make rational economic decisions valuing expected gains and losses equally. **Karl Polyani** (1886-1964), Austrian economist, differed. He said, "The outstanding discovery of recent historical and anthropological research is that man's economic decisions, as a rule, are submerged in his social relationships. He does not act so as to safeguard his individual interest in material possessions; he acts to safeguard his social standing, his social claims, his social assets." That is, social status trumps food on the table.

1944 Plate Tectonics

Geology, plate tectonics: **Arthur Holmes**, Brit, further developed the theory of plate tectonics (ref. 1915). He said that continental drifting is based on the sea floor spreading rather than **Wegener's** 1915 theory of continents pushing or being pushed apart in the sea. (In the 1950s and 1960s new evidence emerged which supported **Holmes's** view, which is now universally accepted. There are 8-12 big plates and 20 or so smaller ones, from a few miles to 60 miles thick.)

Biology: Erwin Schroedinger, published, *What is life*. He wrote how the two groups, living and

1945 Paradox of freedom.

Philosophy, Political Theory: **Karl Popper**: (ref. 1900, '27, '33) *The Open Society and Its Enemies*, "Science must begin with myths, and with the criticism of myths.

"The *paradox of freedom (free will)* is the argument that freedom with no constraining control must lead to very great restraint, as it lets the bully free to enslave the meek, an intolerable result.

"The notion of freedom with no constraining force that is central to the *free will defense* says that *any* interference with an evil-doer's evil actions would destroy his *free will*." This is not true

The Open Society and Its Enemies

Popper's paradox of tolerance was similar: "Unlimited tolerance will lead to the end of tolerance."

That is, if we extend unlimited tolerance even to those who are intolerant, and are not prepared to defend a tolerant society against the onslaught of the intolerant, then the tolerant will be destroyed, and tolerance with them. Tolerance does not imply . . . that we should *always* suppress the utterance of intolerant philosophies; as long as we can counter them by rational argument and keep them in check by public opinion; suppression would certainly be unwise to do.

Paradox of tolerance

But we *should* claim the right to suppress intolerance if necessary even by force; for it may easily turn out that they are not prepared to meet us on the level of rational argument, but begin by denouncing all argument; they may forbid their followers to listen to rational argument, because it is deceptive, and teach them to answer arguments by the use of their fists or pistols."

Don't tolerate intolerance

We should therefore claim, in the name of tolerance, the right not to tolerate the intolerant. We should claim that any movement preaching intolerance places itself outside the law, and we should consider incitement to intolerance and persecution as criminal." These paradoxes show the error and evil of the *inaction* of the perfect God when an evildoer causes suffering.

1945 Philosophy: **Bertrand Russell**, *A History of Western Philosophy*, "To teach how to live without certainty, and yet without being paralyzed by hesitation, is perhaps the chief thing that philosophy, in our age can still do for those who study it.

Russell Quotes

"As a philosopher, if I were speaking to a purely philosophic audience I should say that I ought to describe myself as an agnostic, because I don't think that there is a conclusive argument to prove that there is no God. On the other hand, if I am to convey the right impression to the ordinary man in the street I think that I ought to say that I am an atheist, because, when I say that I cannot prove that there is no God, I ought to add equally that I can not prove that there are not the Homeric gods."

1945 Political Theory: **Stuart Chase**, semanticist (ref. 1938, *Tyranny of Words*), "Can people at the bottom of the economic scale, those called no-account, lazy, degraded, grasp an opportunity when a real one is offered and rise out of their misery? This is the acid test. If they can, democracy is proved. Democracy, like Christianity, has never really been universally tried."

1945 Allies defeat Germany & Japan. Jews were decimated.

Asian wars for independence continued

World War 2: The Allies, mainly US and Russian troops and the fission atom bomb, won. By 1945, Germans killed 80% of European Jews. US and UK bombers demolished German cities & industries. Germans killed around 6M civilians, mostly Jews. Allied forces advanced across Europe and the Japanese-occupied Pacific islands, one by one. The US firebombed Tokyo; c.100K died. US atom-bombed Hiroshima and Nagasaki; 90-146K died. The Japanese army wanted to continue. Emperor said surrender. All told, the war caused 15M battle deaths. c.40M civilian deaths including Russian Orthodox Christians(all told, 28M Russians died). Europe was flattened. 417K US soldiers died. The US had 16M in service. 1M saw some combat. **Pius 12** helped an unknown number of Nazis escape Allied prosecution by providing them passports, mainly to South America. The war caused the spread of universal suffrage and the idea of democracy. In Italy, religious freedom was won. After the war US gave General Motors \$32M for bombing its factories in Nazi Europe.

Pius 12 never criticized Hitler

Christian silence: Could Christian religions have prevented **Hitler's** atrocities? The Catholic Church had about half a billion adherents including one third of Germans and most Italians. Its clergy worldwide had enormous respect. Germany had the most Catholics of any country. But Christians had a history of anti-Semitism.

Pius 12 never publicly criticized **Hitler** or mentioned the Holocaust. What if the Catholic and Lutheran clergy had ceaselessly preached against German atrocities and the killing of Jews?

Asian colonial wars for independence continued.

In Asia Japan was defeated but the anti-colonial wars for independence continued. **Ho Chi Minh**, who had been fighting for Viet-Nameese independence from France since 1930, quoted **Jefferson** on the equality of persons and "inalienable rights" in his 1945 *Declaration of Independence* for Viet-Nam. In Indonesia, an independence movement declared its independence from Holland. The Dutch accepted it in 1949. The UN was established. It's *Charter* recognized the concept of a just war for self defense or as authorized by the UN, and always respecting the "traditional limits of necessity and proportionality."

1945 Political Theory, against totalitarianism: **George Orwell** (1903-50) Brit, said, "Every line of serious work I have written since 1936 has been written, directly or indirectly, against totalitarianism." He wrote *Animal Farm*, a scathing allegory of the Soviet system. "Men exploit animals as the rich exploit the proletariat . . . All animals are equal but some are more equal than others." At Russia's request, the US Army collected all copies it could find for the Soviets, who burned them.

Orwell: "Who controls the past controls the future. Who controls the present controls the past" "In time of universal deceit, telling the truth becomes a revolutionary act." In 1947, he said, "Middle class people are graded according to their resemblance to the aristocracy." (More **Orwell** 1949)

Political Theory: **Winston Churchill**, "We must build a kind of United States of Europe" **Charles de Gaulle**, French leader during and after WW2: "A state worthy of the name has no friends—only interests."

Psychology, blaming the victim: **Bernard Levinson**, a Jewish studies professor reported that some Orthodox rabbis said their Lord permitted the Holocaust as Jews were not holy enough.

Blaming a victim is not uncommon. The Russian Orthodox Patriarch blamed the 1453 fall of Constantinople (now Istanbul) to the Ottomans because the residents were not holy enough. Catholic bishops blamed the great Lisbon flood of 1755 on the residents not being holy enough. Men routinely blame rape victims for their rape saying the woman invited it.

1946 Racial discrimination

Racism: After the war, the US *GI Bill* educated several million veterans. Southern Congressmen wrote the law to be run by states, not by the federal government, anticipating that some states would run it so as to deny benefits to Black veterans. One million Black veterans never got benefits due to discriminatory actions by racist state administrators.

Anti-Semitism

Nazis on trial at the Nuremberg War Crimes trials quoted **Martin Luther's** rants against Jews to justify the Holocaust. No Nazi, not even **Hitler**, was ever excommunicated for his crimes against Jews. Some Vatican officials, like Bishop **Alois Hudal**, are credited with helping Nazis like

Adolf Eichmann, Martin Bormann, and Franz Stangl escaped to S. America or the Middle East.

1946 Political Theory, fascism: “Philosopher **Hannah Arendt** explained that lies are central to the rise of authoritarianism. In place of reality, authoritarians lie to create a “fictitious world through consistent lying. Leaders embraced the lies because they reinforced those leaders’ superiority, and gave them power over those who believe them.” (**Heather Cox Richardson**)

1946 **Morris Cohen**, US philosopher, “If religion cannot restrain evil, it cannot claim effective power for good.”

To be effective, be specific.

Political Theory, practical liberalism: **Wayne Morse** (1900-74) US Senator, “Liberalism cannot be defined in the abstract in any helpful way. Liberalism in politics can best be defined in terms of specific issues. Political liberalism should also be defined in terms of specific objectives.”

“A major objective is the protection of the economic weak and doing it within the framework of a private-property economy. Liberals, emphasizing the civil and property rights of the individual, insist that the individual must remain so supreme as to make the state his servant.”

Weapons don't solve moral problems

Philosophy: **Ernest Hemingway** (1898-1961) American author, “No weapon has ever settled a moral problem. It can impose a solution but it cannot guarantee it to be a just one . . . An aggressive war is the great crime against everything good in the world.”

1946-47 Indian Independence: **Mohandas Mahatma Gandhi** (1869-1948) (ref 1924, ‘30), Indian statesman and advocate of passive civil disobedience, said, “A civilization is to be judged by its treatment of minorities.” **Jawaharlal Nehru**, (1889-1964), a Brahmin and Indian statesman, with **Gandhi**, peacefully led India to independence. **Nehru** had been jailed by the Brits for 12 years.

In an attempt to prevent a religious war, Britain split India into two countries, creating Pakistan, mostly Muslim, and India, mostly Hindu. But gave mostly Muslim Kashmir not to Pakistan but to India to please Kashmir’s raja, a Hindu. Nevertheless, the countries fought, killing 1 million.

Nehru: Religion in India has filled us with horror. Unchecked capitalism makes the poor poorer

Nehru criticized *Hinduism* and capitalism, “No country or people who are slaves to dogma and dogmatic mentality can progress. I want nothing to do with any religion that keeps the masses satisfied to live in hunger, filth, and ignorance. I want nothing to do with any order, religious or otherwise, that does not teach people that they are capable of becoming happier and more civilized on this earth, capable of becoming true *man*, master of his fate and captain of his soul.

“The spectacle of what is called organized religion in India has filled us with horror. I wish to make a clean sweep of it.” “The forces of capitalism, if left unchecked, tend to make the rich richer and the poor poorer.” The Brahmin caste ruled India and taught the masses to be satisfied with their condition.

Political Theory: **Gandhi** was a pacifist. Re passive civil disobedience, he said, “First they ignore you, then they laugh at you, then they fight you, then you win.” He said poverty was a virtue,

Gandhi: There is no God higher than truth. A right-wing Hindu activist killed him.

Philosophy: **Gandhi**, “There is no God higher than truth.” “Prayer is not asking. It is a longing of the soul. It is daily admission of one’s weakness. It is better in prayer to have a heart without words than words without a heart.” He said, “I like your Christ. I do not like your Christians. Your Christians are so unlike your Christ. . . God has no religion. The truth is just the truth.”

Gandhi said, “There are people in the world so hungry, that God cannot appear to them except in the form of bread.” He was assassinated. In 1949, the Indian Parliament abolished the class of untouchables, but the caste system remains powerful. This means 120 million Indian women with high school education and over 25% of women doctors don’t work.

Wall of separation

US Constitution: Supreme Court in *Everson vs Bd of Education* said “wall between church and state must be high and impregnable,” No favoritism at all for or against any religion or religions in general.

Another “Red Scare”

Political Theory, fear of communism, a new “*Red Scare*”: (ref. 1919). Communists took over Eastern European countries that Russian troops had liberated. “Conservatives” in the US said that Communist Soviet Union was a threat to America’s security and anyone sympathetic to communism was a threat to America. Congress’s Un-American Activities Committee (“HUAC”) persecuted persons accused of sympathizing with communism. Ten movie persons called to testify before the Committee refused to answer questions regarding their possible communist affiliations. They were imprisoned for contempt of Congress. (See **Chaplin** in the Index)

American Anti-communists helped Russian communism

As part of the *Red Scare*, US movie executives made a blacklist of suspected disloyal persons. Was Russian communism a threat to America? No, said conservative historians **Will and Ariel Durant**. They said in 1968 that communism survived because of continued fear of war from America. “Given a generation of peace it would have presumably have eroded by the very nature of man.” That is, American “conservatives” actually helped Russian communism.

1947 Thought crimes: Religions and governments have historically persecuted “dissenters” and “heretics”. **Aquinas’s** worst sin was not an evil *act* like murder or torture but *not believing* in his God. **Frederick William 2** of Prussia had a “Ministry of Spiritual Affairs”, the Catholic Church had *Inquisitions*, crusades, and the *Index of Prohibited Writings*. Parliament had its Star Chamber.

Diary of Anne Frank *The Diary of a Young Girl*, **Anne Frank**, a Jewish girl’s 2 year diary when in hiding from Nazis in Amsterdam. (Published in Dutch, in English in 1952.) Has been translated in 70 languages. Her years from age 13-15. She was innocent, full of hope and dreams. Betrayed. The Nazis killed her.

Loyalty to America defined Political Theory, the 1950’s *Red Scare*: **Henry Steele Commager** (1902-’98) an American historian and liberal, helped define modern liberalism in the US. Regarding the Red Scare, he said, “This new loyalty. . . is, above all, conformity, the uncritical and unquestioning acceptance of America as it is. . . the social relationships, the economic practices. . . It identifies “private enterprise” with “Americanism”. The concept of loyalty as conformity is a false one.”

Who are the really disloyal? “It is narrow and restrictive. It denies freedom of thought and conscience. . . Who would be cleared by [HUAC]? Not **Washington**, a rebel. Not **Jefferson** who wrote that all people are created equal. Not. . . **Lincoln**, who freed slaves.” **Commager** said that the really disloyal persons were “those who inflame race hatreds, who sow religious and class dissensions, who subvert the *Constitution* by violating the freedom of the ballot box,. . . who impair democracy by impairing equal educational facilities. Those who deny freedom of speech and of the press and of assembly.”

1947 **Thor Heyerdahl** sailed a balsa log raft from Peru to Polynesia, showing possible migration from S. America.

1947-56 *The Dead Sea Scrolls*, written c.300 BC-AD 100, were found in caves NW of the Dead Sea; written mostly in Hebrew, some in Aramaic. Some are fragments of the Jewish *Old Testament*, some concern possibly the Essenes. They showed *Zoroastrianism’s* (Satan vs. God, judgment day, expect a Messiah) influence on Jews. Some are roughly contemporary with writings of the *New Testament*. The scrolls that were found mention **John the Baptist** but not **Jesus**.

1947 **C S Lewis** Political Theory: **C S Lewis** (ref.1940, ‘44) said, “A great deal of democratic enthusiasm descends from the ideas of people like **Rousseau**, who believed in democracy because they thought mankind so wise and good that everyone deserved a share in the government.”

The danger of defending democracy on those grounds is that they’re not true. I find that they’re not true without looking further than myself. I don’t deserve a share in governing a hen-roost, much less a nation . . . The real reason for democracy is . . . that Mankind is so fallen that no man can be trusted with unchecked power over his fellows.”

C S Lewis “**Aristotle** said that some people were only fit to be slaves. I do not contradict him. But I reject slavery because I see no men fit to be masters.” (**H G Wells** had said this in 1942.

Lewis also expressed an *Argument from Morality*. People have a sense of right and wrong and the only explanation for this is God. (**Beverly** said this was a circular argument. See 1985)

Lewis also articulated the *Argument from Desire* for God. “Humans have an innate desire for joy beyond the natural world.” “There must be an object to satisfy that desire, therefore God exists to be that object. (So, *desiring* a God *creates* a God. Actually, for that person, maybe it does.)

(**Anselm** (1076) had said that because people can think of a great God, one exists. **Kant** killed it)

1947 **Miracles, a Preliminary Study** Theology: **C S Lewis** (wrote *Miracles, a Preliminary Study*. He said that a purely naturalistic account of the world cannot explain the reality of human rationality.

He argued that naturalism (belief that natural laws explain phenomena) “impugns the validity of reason and rational inference,” and as such, naturalists contradict themselves if they use reason to defend their beliefs. Contra: Naturalism is simply using reason and rational inference.

Miracles articulated the *Argument from Reason*, an argument against metaphysical naturalism and for the existence of God (or at least a supernatural being that is the source of human reason). “You can’t know, you can only believe or not.)

1948 **Lewis erred** Theology: The following year, in a public debate, a young Catholic philosopher **Elizabeth Anscombe** (1919-2001) Brit, pointed out logical errors that **Lewis** had made in *Miracles*. He was highly embarrassed. It devastated him. It made him doubt and revise many of the views he had previously confidently posited. His subsequent works concentrated on devotional literature and children’s books. (He issued a revised *Miracles* in 1960. See 1960, ‘81, ‘85)

1948 Epistemology: **Arthur Hays Sulzberger**, *NY Times*, “A man’s judgment cannot be better than the information it is based on. Give him distorted or incomplete data and

you destroy his whole reasoning process and make him something less than a man.” Recall **Vygotsky**, “We can only think in words and concepts we know.”

The *UN Declaration of Human Rights* stated as fundamental rights, the right of ‘ free movement in search for truth and of moral good, justice, and the right to a dignified life. Pope **John 23** repeated this in 1963. The UN established the country of Israel. 750,000 resident Palestinians were displaced.

Marshall Plan 1948 Economics: At President **Truman’s** initiative, the US gave \$12B (\$100B in 2018 dollars) to rebuild Western European non-communist economies. Like most of American aid to foreign countries, the \$12B was spent in America for machine tools, equipment, and food. **Truman** named it the **Marshall Plan**. **George Marshall** was America’s most admired WW 2 general and then Secretary of State. Helping these countries worked. It made the countries of Western Europe so prosperous compared to the countries of Eastern Europe using Communist ideology economics that the strain caused the Soviet bloc to collapse in 1989.

The Holocaust refutes a benevolent God Anti-Semitism: Christians have mistreated Jews as long as they were in a position to do so, but the Holocaust was off the charts. It caused Jews to have a widespread questioning of their God. Regarding the Holocaust, **Elie Wiesel** said, Where was God in all this? Was this another test? one more? Or a punishment? and if so, for what sins? Similarly, **Primo Levi**: (1919-87), Italian, Jewish, survived Auschwitz, “There is Auschwitz, and so there cannot be God.”

The Origin of Chemical Elements Cosmology, chemistry: **George Gamow** and **Ralph Alpher** published *The Origin of Chemical Elements*, a defense of **Lemaitre’s** theory of an explosion at the beginning of the universe, then named by **Lemaitre** as the *Dynamic Evolving model*, which fully mathematically explained the creation of hydrogen and helium, which elements comprised 99% of the atoms in the universe. **Gamow** and **Alpher** also posited that there *should be* cosmic microwave background radiation (“CMB”), leftover glow from the initial explosion of creation. Their theory did not address how heavier elements came into existence. (Seventeen years later, in 1965, CMB was detected.)

Steady State Model of the universe Cosmology: **Thomas Gold**, **Hermann Bondi**, and **Fred Hoyle**, at Cambridge, proposed an expanding but unchanging model of the universe called the *Quasi Steady State Cosmology*. Their theory was consistent with a wide range of astronomical observations but had no singular starting explosion. It posited that new baby galaxies developed in between older galaxies as the universe expanded, in contrast to **Lemaitre’s** 1927 *Dynamic Evolving model* of beginning at a single point.

No telescope at the time was powerful enough to see such baby galaxies. So, there were two different theories of the universe. (**Popper** preferred the QSSC to **Lemaitre’s Dynamic Evolving Model** as QSSC was falsifiable i.e., scientific, and the *Dynamic Evolving Model* wasn’t.)

1948 Philosophy, psychology: **W Somerset Maugham**, (1874-1965), Brit, novelist, “What mean and cruel things men do for the love of God. Men are mean, petty, ignorant, bestial, selfish, slaves now of one superstition, now of another.”

1948 **Information Theory** Mathematics: **Claude Shannon**, of Bell Labs, wrote *A Mathematical Theory of Communicating*. It created *Information Theory*. The basic idea was that information could be broken down into quantifiable entities he called digital digits (now called bits).

1948 Philosophy: **Omar Bradley** (1883-1981), US Five Star General. “The world has achieved brilliance without conscience. Ours is a world of nuclear giants and ethical infants.”

1948 Chauvinism: Cambridge had women students since 1869. It finally awarded them degrees.

1949 **George G Simpson** (1902-84) paleontologist, *The Meaning of Evolution*, “Now all attempts to answer [what humans were] before **Darwin** are worthless, we will be better off if we ignore them completely.”

1949 Bigotry: **Oscar Hammerstein** wrote lyrics for the play *South Pacific*, “You’ve got to be taught, before you are six or seven or eight, to hate all the people your relatives hate.” (full lyrics, p. 496).

The Second Sex 1949 Existentialism: **Simone de Beauvoir**, **Sartre’s** (ref. 1942) companion, *The Second Sex*. Said that women have been defined only in relation to men, While legally equal, women meet social and psychological constraints making them subordinate and unequal. “We are absolutely free today if we choose to will our existence in its finiteness, a finiteness which is open on the infinite. And in fact, any man who has known real loves, real revolts, real desires, and real will, knows quite well that he has no need of any outside guarantee to be sure of his goals; their certitude comes from his own drive.”

Sartre said, “She believed in nothing. Only her skepticism kept her from being an atheist.”

1949 Political Theory, philosophy: **George Orwell** (ref 1941, '45) wrote *1984*, a bleak picture of a totalitarian future. It was a prophetic nightmarish vision of the world he believed the world was becoming. Set in a dystopian future, the novel presented a society under the total control of a totalitarian regime, led by the omnipresent Big Brother, a parody of God. Speaking bad against Big Brother was a thought crime.

The hero is a low-ranking member of 'the Party' who questioned the regime and falls in love with a woman, an act of rebellion where independent thought, dissent, and love are prohibited.

A party leader said, "The Party seeks power entirely for its own sake," "We are not interested in the good of others; we are interested solely in power. Not wealth or luxury or long life or happiness: only power, pure power. It is the great modern classic of a "negative utopia."

1949 China: After 20 years of fighting, **Mao tse tung's** communists defeated a corrupt government under **Chiang Kai-shek** and took control of China. Confucianism, China's culture for two millennia waned as communism replaced it, but Chinese communism is ingrained with Confucianism.

Chiang Kai-shek and his followers retreated to Taiwan and took control of its government.

1949 Physics, quantum electrodynamics: **Richard Feynman** designed diagrams that showed how subatomic particles interact by exchanging photons. As photons can't be observed, they're called virtual photons. *Quantum mechanics* and electromagnetics were roughly combined as quantum electrodynamics ("QED"). **Feynman, Julian Schwinger, and Sin-Itiro Tomonaga** using the new **Feynman's** diagrams, combined them accurately and simply. In particle physics, QED is the relativistic *Quantum Field theory* has proved to be the single most sweeping and successful physical theory ever discovered of electrodynamics. In essence, QED describes how light and matter interact and is the first theory where full agreement between quantum mechanics and special relativity is achieved. They won the Nobel prize in Physics, 1965

QED

QED has been the model and template for all subsequent quantum field theories in particle physics. QED is the relativistic quantum field theory of electrodynamics.

In essence, QED mathematically describes all phenomena involving electrically charged particles interacting by means of exchange of photons and represents the quantum counterpart of classical electromagnetism, giving a complete account of matter and light interaction.

Feynman:
Religion is
a culture
of faith.
Science is
a culture
of doubt.

Philosophy: **Feynman**, "I can live with doubt and uncertainty. I think it's much more interesting to live not knowing than to have answers that may be wrong." "Physics is the ultimate intellectual adventure, the quest to understand the deepest mysteries of our universe . . . Science enables us to make useful things and gives enjoyment in learning stuff." "To progress we must leave room for doubt. Scientific knowledge is a body of statements of varying degrees of certainty, none absolutely certain." "Physics isn't the most important thing. Love is." "Religion is a culture of faith; science is a culture of doubt."

Feynman "Science leads us to imagine all sorts of things infinitely more marvelous than the imagining of poets and dreamers of the past. It shows that the imagination of nature is far, far greater than the imagination of man.

For instance, how much more remarkable it is for us all to be stuck-half of us upside down-by a mysterious attraction, to a spinning ball that has been swinging in space for billions of years, than to be carried on the back of an elephant supported on a tortoise swimming in a bottomless sea."

Feynman
Quotes Doubt "is not a new idea; this is the idea of the age of reason. This is the philosophy that guided the men who made the democracy that we live under. The idea that no one really knew how to run a government led to the idea that we should arrange a system by which new ideas could be developed, tried out, and tossed out if necessary, with more new ideas bought in a trial-and-error system. "

Neurons
(nerve cells)
are the
primary
components
of nervous
tissue.
Glial cells
support
them.

Thinking, Anatomy of the nervous system: The nervous system is comprised of the central nervous system (brain and spinal cord), the peripheral nervous system (autonomic, enteric and somatic nervous systems. (The somatic nervous system is part of the peripheral nervous system that connects the brain and spinal cord with the muscles and skin. It controls voluntary movements, sensory input, and reflex actions)

Neurons (nerve cells) are the primary components of nervous tissue in all animals along with the glial cells that give them structural and metabolic support They help to receive and conduct impulses. Neurons communicate with other cells via synapses, which are specialized connections that commonly use minute amounts of chemical neurotransmitters to pass the electric signals.

A neuron/nerve cell is an excitable cell that fires electric signals called action potentials across a neural network in the nervous system. There are 86B neurons and an equal number of supporting cells in the brain. (See 1964 for more on the brain)

1949 Religion, Evangelism, **Billy Graham**: (1918-2018) a famous charismatic evangelist, preached against labor unions, godless communists (He supported the notorious demagogue, Senator

Graham

Joseph McCarthy to his end) and preached the godliness of unregulated capitalism.

**adopted
the Design
Argument**

He preached that an apocalypse was near. Such belief makes long term social or economic planning unimportant. He said, "If Christ came back today and started preaching, we would put him on the cross quicker than we did 2000 years ago." He said the world was so complex that it couldn't have happened by chance. In fact, Darwinism and **Lyell** showed that's exactly how the Earth and its creatures did evolve. (More **Graham** 1871, 1958, 2001, pp. 403, 413)

**1950
Four
fundamental
forces**

Physics: Many physicists, including **Einstein**, continued to try to find a *Unified Field Theory* to reconcile the four then-known fundamental forces that govern everything that happens in the universe (1. Strong Nuclear force (holds quarks, neutrons and protons together in an atom). 2. Electromagnetic force, magnetism. 3. Weak nuclear force, radioactivity, and 4. Gravity, the weakest force by far. How weak? We don't know precisely with current tools. The strong and weak nuclear forces (3 and 4.) work only inside atoms. (See 1968-Physics. **Weinberg** cut the four forces to three as 2 & 3 were the same.)

1950 **Philosophy, theology:** **Einstein**, "I believe in **Spinoza's** God who reveals himself in the orderly harmony of what exists, not in a God who concerns himself with the fates and actions of human beings." "A human being is part of the whole called by us universe, a part limited in time and space. . . Our task is to free ourselves from the prison by widening our circle of compassion to embrace all living creatures and the whole of nature in its beauty."
"If there is any religion that could respond to the needs of modern science, it would be Buddhism."

**Science is
refined
everyday
thinking**

Einstein: "I rarely think in words at all. A thought comes and I may try to express it in writing."
"It's not that I am so smart; it's just that I stay with problems longer. I have no particular talent. I am merely inquisitive." Said that "The whole of science is no more than a refinement of everyday thinking."
Science, measured against reality, is primitive and childlike - and yet it is the most precious thing we have.

**God of
the Gaps
Argument**

Einstein also said, "The doctrine of a personal God intervening in natural events could never be refuted. . . for this doctrine can always take refuge in those domains in which scientific knowledge has not yet been able to set foot." This is the "God of the Gaps" argument, a sister theory to the *Humans have limited ability* argument. (See 2006-**Dawkins**)
"If you've never done anything wrong it's probably because you have never tried anything new."

**Einstein
Quotes**

Philosophy: **Einstein** said, "A human being experiences himself, his thoughts and feeling as something separated from the rest, a kind of optical delusion of his consciousness. This delusion is a kind of prison for us, restricting us to our personal desires and to affection for a few persons nearest to us . . . The important thing is not to stop questioning. Curiosity has its own reason for existing." The most incomprehensible thing about the world is that it is at all comprehensible."

**Five biggest
unsolved
problems
in science**

Science: Before scientific thinking, (under 3,000 years ago), *everything* was explained by gods. Not now. But there *are* unsolved questions in all sciences. **Arthur Wiggins** and **Charles M Wynn's** book, *The Five Biggest Unsolved Problems in Science*, suggests: 1. "How do some particles have mass and others have none? 2. What chemical reactions created the first living things? 3. What is the complete structure and function of the proteome? 4. Is accurate weather forecasting possible? 5. How is it that the universe is expanding faster and faster?"

Science daily finds new evidence that closes gaps in the fossil record and finds or gets closer to answering unsolved questions about the universe and life on Earth. Some theists feel it is a mistake to base belief in a God on gaps in scientific knowledge, as those gaps narrow daily.

**1950
Einstein
explained
General
Relativity**

Physics: **Einstein** summarized the general theory of relativity, "Time and space and gravitation have no separate existence from matter. Physical objects are not in space, but these objects are spatially extended. So, the concept 'empty space' loses its meaning. As the theory of general relativity implies the representation of physical reality by a continuous field, the concept of particles or material points cannot play a fundamental part, . . and can only appear as a limited region in space where the field strength /energy density are particularly high." Also said, "Measured against reality, science is primitive and childish, yet the most precious thing we have."
Scientific research, mostly government funded, exploded after WW2 and continues to this day.

1950 **Political Theory:** **John Dewey** (ref 1917), "It is demonstrable that many of the obstacles to change which have been attributed to human nature are in fact due to the inertia of institutions and to the voluntary desire of powerful classes to maintain their existing status."
A good reason and the real reason. "Fear created gods."

1950 **Thinking:** At the time, scientists were thinking about a new way of thinking about thinking. **Alan Turing**, (1912-54) Brit, genius, the best wartime code-breaker: He also posited the **Turing** test for artificial intelligence. If a human couldn't tell if it were a computer or a person talking.
He designed a model of "the structure of thought, an abstract model of computation," which led to the invention of computers, a **Turing** machine of all known facts, which, by design,

performed *deductive* logic, where the answer to a problem is contained in the premises, where the rules of inference are pre-given and information is never created, only shuffled around.

A universal “**Turing** machine” could compute anything that could be computed by an algorithm. He had the idea that perhaps the brain was a kind of **Turing** machine. (See 1964- **Putnam**)

1950 *The Big Bang* **Cosmology; Hoyle** (ref.1948) on BBC derisively termed **Lemaitre’s** singularity theory the “*Big Bang*.” This caught on. An expanding universe working backward of course gave clues as to when the *Big Bang* bung. *Big Bangers* thought the universe was c.1.8B years old. (This soon changed.) In the contest between *Steady State* vs. *Big Bang* models, discoveries in 1953, ‘61, ‘64, and ‘92 finally decided that *Big Bang* was more accurate.

Stupid people are sure. Smart people doubt. **Philosophy, dogma: Bertrand Russell**, “Religion is based . . . mainly on fear. . . fear of the mysterious, fear of defeat, fear of death. The fundamental cause of the trouble is that. . . the stupid are cocksure while the intelligent are full of doubt. The finding of arguments for a conclusion one wants to reach is not philosophy, but special pleading.”

Jerry Coyne (ref p.197), “Theology is the only academic discipline where people get paid not to investigate their beliefs, but to rationalize them.” To conquer fear is the beginning of wisdom . . . There is not one word in the Gospels in praise of intelligence. (more **Coyne** 2009)

[There are organizations named “*The Society of Christian Philosophers*” and “*The Society of Catholic Scientists*.”]

Russell Quotes “Fear is the parent of cruelty . . . it is no wonder if cruelty and religion have gone hand in hand. Religion is the main source of superstition, and one of the main sources of cruelty.”

Science created almost everything that distinguishes the modern world from earlier centuries, which achieved its most spectacular triumphs in the seventeenth century.”

Catholic theology: Monsignor William Greene told Gold Star parents in St. **Patrick’s** cathedral that death in battle was “part of God’s plan for populating the kingdom of heaven.”

1950 **Ensoulement** **Dogma: Pope Pius 12’s Humani Generis** encyclical, permitted Catholics to *discuss* evolution but only if one believed that God put a soul into humans at some undefined point. Also, that evolution “should not be accepted as valid without more evidence.” (Ninety years after **Darwin**.)

1951 Catholic Theology, reconciling the Bible with science: Pope Pius 12 said the *Big Bang* was the biblical time of “Let there be light,” proof that God existed. **Lemaitre**, a priest, demurred, said his theory “remains entirely outside any metaphysical or religious question.”

1952 **Believers have the burden of proof** **Bertrand Russell**: To refute the assertion that doubters had the burden of proof to *disprove* claims of religions, **Russell** coined the concept of the *orbiting teapot*. “If one person were to assert that a teapot orbited the Earth, and as it could not be proven not to exist, that therefore it did exist, he would be laughed at. But, if, 2,000 years ago, such teapot had been written in theological texts, and taught to children as sacred truth every Sunday, *not believing* in the orbiting teapot would be laughed at.”

If a thing has a name, it exists. That is, *belief* is not proof. **John Stuart Mill** (ref. 1835, ‘51, ‘59, ‘63, ‘69, ‘74) a century earlier explained, “The tendency has always been strong to believe that whatever [had] a name must [have] an independent existence of its own, and, if no real entity could be found, men did not then suppose that none existed, but imagined that it was something particularly abstruse and mysterious.”

1952 **Biology: Stanley Miller**(1930-2007), reconstructed Earth’s atmosphere of 4B BC, and simulated lightning. Amino acids, sugars, nucleotide bases. *Porphyrins*, building blocks for biology, appeared.

1952 **Philosophy: Hemingway** (ref 1937, 40, 47) showed the unconquerable spirit of man in *The Old Man and the Sea*.

Wilhelm Baade, German-American: the distances to galaxies are twice as distant as then thought.

Mutual Assured Destruction **Political Theory:** Russia made a hydrogen *fission* bomb. This fueled anti-Russian sentiment promoted by conservatives. They ignored the doctrine of *Mutual Assured Destruction* (“MAD”) which assumes possessors of nuclear weapons are rational. So the doctrine ensured that neither USA or Russia would use the bomb as decision makers in both countries were rational.

Blackstone had said the same thought **Law, Political Theory: Learned Hand** (1872-1961), a most prominent American jurist, “There is risk in refusing to act til the facts are all in; but is there not a greater risk in abandoning all the conditions of rational inquiry? Risk for risk, for myself I would rather take my chance that some traitors will escape detection than spread abroad a spirit of general suspicion and distrust, which accepts rumor and gossip in place of undismayed and unintimidated inquiry.”

c.1952
Our
miseries
come from
stupidity,
and malice

Aldous Huxley: "Most human beings have an almost infinite capacity for taking things for granted." "At least two thirds of our miseries spring from human stupidity, human malice, and those great motivators and justifiers of malice and stupidity, idealism, dogmatism and proselytizing zeal on behalf of religious or political organizations." "To see ourselves as others see us" (**Robert Burns**) is a most salutary gift. Hardly less important is the capacity to see others as they see themselves. We can pool information about experiences, but never the experiences themselves." (1954)

1953 Cosmologists saw that the *Big Bang* explained how helium came into being but *Steady State* did not.

1953
What does
DNA do?

Physics / Chemistry, DNA: (ref. 1944) DNA is a molecule carrying genetic instructions for the development, functioning, and growth reproduction of all known organisms (& many viruses). **Maurice Wilkins, James Watson** (Ph.D at 22), and **Francis Crick**, were the first to identify the *spiral double helix* molecular structure of DNA. They found that every cell in an individual living thing contains a DNA molecule in the nucleus of the cell for that person or organism, shaped like a double helix (two parallel and connected spiral strands), each of which strands contains all the genes for that person.

Genes are the units of all characteristics of a person or organism, that is, a total blueprint for the person or organism. Every person has 2 copies of each gene, one inherited from each parent.

99% of genes are the same in all people. Less than 1 percent are slightly different between people. Alleles are forms of the same gene with small differences in their sequence of DNA bases. These small differences contribute to each person's unique physical features.

How new
species
come about

Mitosis: When a cell divides (mitosis), the double helix splits. One strand goes to each new cell, which then grows an identical strand to make a new double helix in each new cell. So each new cell's double helix has all the genes that the cell that split had. How is a new species created?

If a gene in the new strand does not replicate itself not identically, one or more of genes in one of the two new cells is not identical to its parent cell. That non-identical gene will cause its offspring to have a different characteristic.

That different characteristic could be a big change, a new species, or a helpful change or a harmful change or what is most likely, a totally insignificant change.

How can a gene replicate itself not identically? In copying itself, it might be exposed to a chemical or radiation that mutates the gene. So it now has a blueprint different from the parent's. Gene mutations are random and thus have no purpose.

Wilkins and **Watson** based their DNA work on the work of **Rosalind Franklin** (1920-58), a graduate of Cambridge chemist and accomplished X-ray crystallographer.

She had deciphered the X-rays that let them figure out the double helix structure of a DNA molecule with an electron microscope. They used her work not telling or crediting her.

She died of cancer at 37. Today portions of the double helix strands containing the genes can be identified, cut out, modified, and re-inserted in the molecule.

Half of the 35,000 genes coded by the DNA in the human genome are in the brain. There are an estimated 86 billion neurons in the brain. Each neuron connects with c.10,000 neurons.) **Watson** described their work in 1976 in the book, *The Double Helix*.

1954
Commager
We protect
freedom to
discover
truth

Political Theory, The Cold War: **Henry Steele Commager** (ref. 1919, '47), In *Freedom, Loyalty, Dissent*, he wrote, "Freedom is not a luxury that we can indulge in when. . . we have security and prosperity and enlightenment; it is, rather, antecedent to. . . these, for without it we can have neither security nor prosperity nor enlightenment. Uncertain of principles, we fall back on emotion; unfamiliar with the past, we are afraid of the future."

"Increasingly we look to men, ideas, and institutions not from the point of view of how they work, but from the point of view of how they ought to work ... We do not protect freedom in order to indulge error. We protect freedom to discover truth. By insisting upon conformity in the intellectual arena and by threatening with disapproval all those who dissent or who give us unpopular advice, we are in danger of following the totalitarian philosophy-and the totalitarian mistakes."

Loyalty
Patriotism

"A nation that silences or intimidates original minds is left only with unoriginal minds and hope to hold its own in the competition of peace or of war. . . We should not forget that our tradition is one of protest and revolt." He spoke at the start of the "cold war" with Russia, when "conservatives" spread fear of communism for political gain. It was a second "*Red Scare*"), when anything considered "Russian" was considered disloyal to America. Many US politicians, including Senator **Joseph McCarthy** and **Richard Nixon** made their reputations as "anti-communists."

America's
Cold War
Red Scare

The *Red Scare* illustrated what historian **Richard Hofstadter** called "the paranoid style in American politics." **McCarthy** had a two year spree of ruining persons by calling them communists. Some persons believed that calling someone a communist ended any argument. Leading the criticism against the "Reds" were the **Hearst** papers, the magazines of **Henry Luce** and the *New York*

Times. The cold war was a dark time for American academic freedom and civil liberties. The US took over France's war against Viet-Nam independence, wasting 77,000 American soldiers' lives.

- 1954 Law: Felix Frankfurter (1882-1965), Supreme Court Justice, "The core of the difficulty is that there is hardly a question of any real difficulty before the Court that does not entail more than one so-called principle. Anybody can decide a question if only a single principle is involved.

Separate schools are inherently unequal Law, The Supreme Court, under **Earl Warren**, in *Brown vs. Board of Education*, "We conclude that in the field of public education the doctrine of "separate but equal (*Plessy vs. Ferguson*) has no place. Separate educational facilities are inherently unequal." Future Supreme Court Justice **Thurgood Marshall** was the NAACP attorney for the plaintiffs. Southern states began "massive resistance" to school integration, shifting funding for public schools to "private" White schools.

Ideas of freedom are the most powerful political weapons man has ever forged 1954 Philosophy, Law, Liberty: William O Douglas (1898-1980), Supreme Court Justice, in *An Almanac of Liberty*, wrote, "Ideas are indeed the most dangerous weapons in the world. Our ideas of freedom are the most powerful political weapons man has ever forged." "If we remember that, we will never have much to fear from communism." In *Roth vs US*, in 1957, **Douglas** wrote, "if the *First Amendment* means anything in this field, it must allow protests even against the moral code that the standard of the day sets for the community." In other words, literature should not be suppressed merely because it offends the moral code of the censor. He also said that the function of free speech under our system of government is to invite dispute.

Catholicism 1954 Philosophy: Einstein, "I am convinced that some political. . . practices of the Catholic organizations are detrimental and even dangerous for the community as a whole, here and everywhere." **Einstein's God** In 1955, said, "Try not to become a man of success, but rather try to become a man of value. I do not believe in the God of theology who rewards good and punishes evil. . . The presence of a superior reasoning power. . . revealed in the incomprehensible universe, forms my idea of God."

The goal of science Said, "The grand aim of all science is to cover the greatest number of empirical facts by logical deduction from the smallest number of hypotheses or axioms." For years, **Einstein** sought a unified field theory. "The child notes a definite plan in the arrangement of the books, a mysterious order, which it does not comprehend, but only dimly suspects. That, it seems to me, is the attitude of humans, even the greatest and most cultured, toward God. We see a universe marvelously arranged, obeying certain laws, but we understand the laws only dimly. Our limited minds cannot grasp the mysterious force that sways the constellations."

Imagination trumps knowledge On Cosmic Religion: "I believe in intuition and inspiration. Imagination is more important than knowledge. For knowledge is limited, whereas imagination embraces the entire world, stimulating progress, giving birth to evolution. It is, strictly speaking, a real factor in scientific research." "Reality is merely an illusion, albeit a very pleasant one." (**Einstein** died in 1955.)

- 1955 Philosophy: Erich Fromm (1900-80), American psychologist, "Man today is confronted with the most fundamental choice: not that between Capitalism and Communism, but that between *robotism* (of both the capitalist and the communist variety), or Humanistic Communitarian Socialism."

Philosophy: Pete Seeger (1919-2014), American folk singer, pacifist, (Partial lyrics) "Where have all the soldiers gone? Gone to graveyards, every one. Oh, when will they ever learn? Oh, when will they ever learn?" He said, "In the largest sense, every work of art is protest." (More lyrics p. 503)

Problem of Suffering 1955 Theology, Theodicy, Atheism: John L Mackie (1917-81), Australian philosopher, atheist, wrote, "In its simplest form the problem is: God is omnipotent; God is wholly good; and yet evil exists. There seems to be some contradiction between these three propositions, so that if any two of them were true the third would be false. But at the same time all 3 are essential parts of most theological positions: the theologian, it seems, at once must adhere and cannot consistently adhere to all three."

Free will or automaton is a false dilemma. As we saw at 1940, **C S Lewis** (ref. 1947) had said that a God only had two choices regarding giving humans *free will*, total or none. **Mackie** disputed this. The theist claims God is omnipotent, omniscient, and all-loving. **Mackie** reasoned in *Evil and Omnipotence*, "If God has made men such that in their free choices they sometimes prefer what is good and sometimes what is evil, why he could he not have made men such that they always freely choose the good? If there is no logical impossibility in a man's choosing the good on one, or on several occasions, there cannot be a logical impossibility in his freely choosing the good on every occasion."

Giving only two choices, no *free will* or total unrestrained *free will*, the usual argument in a *free will defense*, is both setting up a straw man and is a false dilemma, both logical fallacies. There are reasonable other choices, not just two (See p. 443 for 65 logical fallacies)

- Mackie** **Mackie** said, "(The traditional monotheistic) God was not, then, faced with a choice between making innocent automata and making beings who, in acting freely, would sometimes go wrong: there was open to him the obviously better possibility of making beings who would act freely but always do right. Clearly, his failure to avail himself of this possibility is inconsistent with his being both omnipotent and perfectly good." It can be shown, not that religious beliefs, the "perfect" God in particular, lack rational support, but that they are positively irrational, that several parts of the essential theological doctrine are inconsistent with one another."
- 1955 **The Problem of Suffering.** **Mackie** said that a God could not be omnipotent, omniscient and benevolent all at the same time if evil or suffering exists. Any two [it is immaterial which two] could be true at the same time if evil or suffering exists but not all three. "No one claimed attribute of God by itself is inconsistent with evil or suffering, but all three together are." In other words, the perfect Abrahamic God logically can not exist as its defined principal attributes together are contradictory to the reality of evil and suffering. (**Mackie's** 1978 *Inventing Right and Wrong* said, "There are no objective values." So ethics must be invented rather than discovered like natural laws.)
- 1955 **Basic fact of human existence is absurdity** **Philosophy, Existentialism: Albert Camus** (1913-60), French, Nobel 1957. "The evil in the world almost always comes from ignorance, and good intentions may do as much harm as malevolence if they lack understanding. Man is the only creature who refuses to be what he is." "I do not believe in God and I am not an atheist." Comment: If one believes that a supernatural entity created the universe, one likely believes that the entity did it for a purpose and finding that purpose is important. **Mohammad** quotes Allah as saying that he created humans to worship him.
- Camus** "It was previously a question of finding out whether or not life had to have a meaning to be lived. It now becomes clear, on the contrary, that it will be lived all the better if it has no meaning. Giving man a meaning for his life is any priest's first job." "If there is a sin against life, it consists not so much in despairing of life as for hoping for another life and in eluding the implacable grandeur of this life."
- 1955 **Racism: Rosa Parks**, a Negro, in Montgomery, Alabama, first sat in the Black section of a public bus, but when many whites got on and filled the forward seats, the driver told her to move to a seat further to the rear. She refused to give up her bus seat and move to the rear. She was arrested, fined, fired from her job as a seamstress in a department store, and received death threats for years. Blacks boycotted the bus system for 381 days and won. The Supreme Court ruled that bus segregation in interstate commerce was unconstitutional.
- 1956 **Theology: Joseph Lewis** (1889-1968), freethinker, reporter for the AP, "If I had the power that the *New Testament* says that **Jesus** had, I would not cure *one* person of blindness. I would make blindness impossible, I would not cure *one* person of leprosy, I would abolish leprosy.
- 1957 **Impartial? Impossible** **Philosophy: Charles P Curtis** (1891-1959) American lawyer, educator, "Fraud is the homage that force pays to reason." "Guilt and sin are only a fear of the past." "There are only two ways to be quite unprejudiced and impartial. To be completely ignorant or completely indifferent."
- 1957 **Law: William J Brennan, Jr** (1906-97), US Supreme Court Justice, "Custom (precedent), was always the common law's most cherished source. So much so, in fact, that not until well into the 17th Century did English lawyers make any clear distinction between law-declaring and law-making."
- 1957 **Psychology: Popper** (ref. 1900, '27, '33, '45, '48) described the *Oedipus paradox*, i.e., predicting an event may tend either to bring it about or prevent it, depending on people's reactions.)
- 1957 **Racism in America: William F Buckley**, once the most prominent American political conservative, said the white race was the more "advanced" race and the most fit to govern. "In America, the educated class moved to the cities and their suburbs, leaving the lesser educated to lesser jobs. in rural areas."
- Universal grammar** **Linguistics: Noam Chomsky** (1928-) His first book on linguistics, *Syntactic Structures*, criticized the then dominant theory in linguistics. He argued that there was such a syntactical similarity among the languages of the world, so there must be an innate "universal grammar" (like **Kant's a priori** knowledge), which **Chomsky** said was simply, *subject-verb-object*. It caused a "significant upheaval" in linguistics. He criticized **B F Skinner's** 1957 *Verbal Behavior* which viewed language as learned behavior. **Chomsky's** ideas dominated linguistics as he extended and developed his idea of a universal grammar. But subject-verb-object is the only possible way that statements can be meaningful. No other word order makes sense. So languages are simply logical. (The German language sometimes puts the verb last.) (More **Chomsky** 1950s, '75, '96)
- 1957 **Political Theory, objectivism: Ayn Rand / Alisa Zinov'yevna Rosenbaum** (1905-82), born in St. Petersburg, Russia to a prosperous family opposed to communism. She emigrated to the US, wrote

- Objectivism** *Atlas Shrugged*, extolling an extreme libertarian philosophy she called Objectivism. Said, "I started my life with a single absolute: that the world was mine to shape in the image of my highest values and never to be given up to a lesser standard, no matter how long or hard the struggle." Objectivism resonated with a significant minority of right wing thinkers. Critics said it was, like **John Kenneth Galbraith's** opinion of *Social Darwinism*, merely an attempt for a moral justification for selfishness.
- 1957 **Cognitive Dissonance.** Psychology: **Leon Festinger's** *A Theory of Cognitive Dissonance* coined that term and showed how people *tenaciously* cling to their beliefs when confronted with facts contradicting those beliefs, (even to using fallacious reasoning). When a person has expressed an opinion on a subject, he tends to think that someone's disagreement with that opinion is akin to calling him personally dumb. That hits deep. Some persons may even declare contradictory facts irrelevant. [This is akin to *motivated reasoning* or *confirmation bias*. People, including purportedly rational believers and non-believers, tend to interpret new "facts" to confirm their beliefs.].
- Cognitive dissonance is common.** **Leo Tolstoy** (ref 1532, 1865, '98, 1908) had described this tendency before. He said, "Most men, including those familiar with problems of greatest complexity cannot accept even the simplest and most obvious truth if it be such a would oblige them to admit the falsity of conclusions they have delighted to explain to colleagues, and have taught to others." **Mark Twain** in 1897 and **Max Planck** in 1919 had described the concept of *cognitive dissonance* but had not given it a name. **Bertrand Russell** described this tendency in 1952 with his concept of an orbiting teapot. Why do we resist changing our beliefs so stringently? When one's belief is challenged, the challenged person does not consider it merely as a challenge to an opinion. He takes it as an attack on his being, and an accusation that he is personally stupid or ignorant, a lesser person.
- Disagreeing with someone's opinion is an attack on his being**
- 1950s **How we think** Cognitive psychology: Studying internal causes, not the environment, began to replace behaviorism (ref. 1913), using new sciences like neuroscience, linguistics, anthropology. Many psychologists posited theories as to how the mind processes information which affect one's thinking.
- 1958 **Bromley Oxnam**, Methodist bishop, There is something radically wrong with so-called free enterprise.
- We think in words we know** Psychology: **Lev Vygotsky** (1896-1934) Russian, "We learn to think based on concepts and words we know." He founded cultural-historical psychology. Thought is restructured while it is transformed.. into speech. His theories were known in Russia in the 1930s but not known in the West until 1958. If a child has never heard the word "bored", or told about the concept, he will never think he is bored. So the more we read, the more words we will learn, thus, the better we can think.
- 1958 **Religion, Billy Graham** (ref.1949) said that he believed in the Devil for three reasons: 1."The *Bible* says so. 2. I see his work everywhere. And 3. Great scholars have recognized his existence." But, Western educated classes, had largely replaced literal belief in the *Bible* for the social attractions of churches. **Graham** said he believed in evolution but that it was guided by God and the world was so complex that it couldn't have happened by chance. Guided by God is not *Darwinism*.
- 1958 **Aldous Huxley Quotes** **Huxley:** "The nature of power is such that even those who have not sought it, but have had it forced upon them, tend to acquire a taste for more. Democracy can hardly be expected to flourish in societies where political and economic power is being progressively concentrated and centralized." "Societies are composed of individuals and are good only insofar as they help one realize their potentialities and to lead a happy and creative life. An unexciting truth may be eclipsed by a thrilling falsehood."
- Smart people like facts** Psychology: **Huxley** said, "In a crowd, people lose their powers of reasoning and their capacity for moral choice." (a/k/a Mob psychology) "Unlike the masses, intellectuals have a taste for reason and an interest in facts." "Most kings and priests have been despotic, and all religions have been riddled with superstition."
- Aldous Huxley Quotes** Thinking: "Children are nowhere taught, in any systematic way, to distinguish true from false, or meaningful from meaningless, statements. Why? Because their elders, even in the democratic countries, do not want them to be given this kind of education. Never give children a chance of imagining that anything exists in isolation. Make it plain from the very beginning that all living is relationships. Show them relationships in the woods, in the fields, in the ponds and streams, in the village and in the country around it. Rub it in." "That men do not learn very much from the lessons of history is the most important of all the lessons that history has to teach. It's a bit embarrassing. . . to have been concerned with the human problem all one's life and find at the end that one has no more advice to offer than 'Try to be a little kinder.'"
- 1958 **Benefits** **Philosophy: Feynman** (ref. 1927, '49) explained the value of science. "Most importantly, it enables persons to do and make all kinds of useful and essential things; for many, it gives intellectual

- of science** enjoyment; thirdly, it provides opportunities for people to think and doubt. Our freedom to doubt was born of a struggle against authority in the early days of science. It was a deep and strong struggle.”
He proved that quantum mechanics is mathematically equivalent to a sum over all possible histories. In the case of the wave function means all possible values of the two variables, R and t. But R is the radius of the universe; it cannot be less than zero, which is the singularity. (“t” is a natural time coordinate.)
- 1959 **Louis & Mary Leakey** found remains of a 1.75 million year old tool-making human in the Olduvai Gorge.
- The Two Cultures** 1959 Philosophy, humanism: **C P Snow’s** *The Two Cultures and the Scientific Revolution* (humanities and science) described how scientists and humanities intellectuals shortsightedly saw the world differently and therefore did not understand or sympathize with each other. One definition of humanism emerged to unite the two groups, “The life of the intellect in the service of man.”
- Creationists don’t know natural selection** Theology: **Herbert Muller**, Nobel laureate, geneticist, marking *The Origin of Species*’ centennial, ridiculed the fact that some schools and universities even after 100 years still taught evolution merely as a possible *alternative* to *Genesis*. Creationism was still popular, and even some “well-educated” people do not understand *natural selection*.
- 1960 Philosophy: **C S Lewis** (ref. 1940, 44, 47-8, 55) revised and expanded his arguments in *Miracles* (ref 1948) to correct the errors **Anscombe** had found in 1948. **Anscombe** responded in 1981.
- Problem of Suffering** 1960 Philosophy, *The Problem of Suffering*: **H J McCloskey**, Australian, agreed with **Mackie** (ref. 1955) that, “A contradiction is involved in the fact of evil on the one hand, and belief in the omnipotence and perfection of God on the other.” He and **Mackie** said that theists were committed to an internally inconsistent set of beliefs and hence that Biblical theism was necessarily false.
- Big Bang vs. Steady State models** 1961 Cosmology: *Big Bang* cosmologists said young galaxies could have existed only in a young universe and could be detected in the far reaches of space as light from them would have taken billions of years to get to Earth so such light would be from an early time. *Steady State* modelers had said young galaxies should be distributed evenly throughout the universe. Radio astronomy showed that younger galaxies appeared mostly in the far reaches of space as the Big Bangers predicted. So, re *Steady State* vs. *Big Bang*, A win for *Big Bang* (next chapter 1964)
- 1961 Cosmology: **Robert Dicke**, Carbon based life can only arise when gravity is small as that’s when burning stars exist. This was the first iteration of the weak *Anthropic Principle*. (see 1973).
- Madness and Civilization** 1961 Philosophy, Relativism: **Michael Foucault’s** (1926-84) *Madness and Civilization, A History of Insanity in the Age of Reason* argued that rationality itself was a coercive “regime of truth.”
He argued that *natural selection* applies to groups as well as individuals. Groups that bonded / cooperated most firmly against outsiders survived best, i.e., produced the most offspring. And religion is the most potent bonding force. People know what they do; frequently they know why; but what they don’t know is what they do does.”
- Original Sin** 1961 Philosophy: **Ayn Rand** (ref.1957) ridiculed *Original Sin*. “To punish for a crime committed before one was born mocks justice.” “Devotion to the truth is the hallmark of morality; there is no greater, nobler, more heroic form of devotion than the act of a man assumes the responsibility of thinking.”
- 1961 **Chaos theory**: **Edward Lorentz**, meteorologist, developed a computer model based on 12 factors determining how to predict weather patterns. He found that small changes in variables caused huge changes over time. Until then, physics had assumed linear processes, small changes produce small results, but some fields like biology don’t follow linear processes, small changes in variables may cause multiple changes. (see 1969-chaos)
- The 60s, American society critiqued** 1961-’65 Overview, The 1960s were a time of an upheaval in social thought in the US. Namely:
1961: US race relations: Blacks and Whites toured the South by bus, testing a Supreme Court ruling making discrimination in interstate busses unconstitutional. White supremacist mobs beat them bloody. It shocked America. In Albany Georgia, with 22,000 Blacks, over 1,000 were jailed for marching, assembling, and protesting. The Albany police chief asked a nine year old prisoner his name. The boy replied, “Freedom. Freedom” **Malcolm X** said, “Show me a capitalist, I’ll show you a bloodsucker.”
- Silent Spring** 1962: Environment: **Rachel Carson’s** (1907-64) *Silent Spring* awakened the world to the destruction of Earth’s environment by synthetic pesticides, particularly on birds, hence the metaphor of a ‘silent spring’ without bird song. **Carson** accused the chemical industry of lying to the public, and public officials’ incompetence by accepting the industry’s claims.
Makers of poisonous pesticides. But it caused the US to reverse its national pesticide policy, led to a nationwide ban on DDT for agricultural use, and was instrumental in

mobilizing environmentalists and creating the Environmental Protection Agency.
The Sierra Club's *In Wilderness is the Preservation of the Nation* energized environmentalists

Poverty Environment **Poverty:** **Michael Harrington's** *The Other America* showed the widespread poverty in rich America.
Care of mental health: **Ken Kesey's** *One Flew over the Cuckoo's Nest* showed horrible treatment of the mentally ill. *The Port Huron Statement* was a manifesto of the New Left.

Human rights 1963: **Women's Rights:** **Betty Friedan's** *Feminine Mystique* spurred women's demands for equality.
Civil rights: **Martin Luther King Jr** gave his, "*I have a dream*" speech at a huge civil rights rally in Washington DC. His *Letter from a Birmingham Jail* was powerful for the Civil Rights movement.
Equality: Congress passed the *Equal Pay Act*.
Racism: President **Kennedy** proposed a sweeping Civil Rights law. It passed in 1964 under President **Lyndon Johnson**. The Supreme Court soon weakened it. The Court allowed racist state laws which took the vote from anyone convicted of a felony. These were mostly Blacks.

White collar crime 1964-65: **The Free Speech Movement**, centered in Berkeley, energized student activists nationwide.
1965: **Dishonest business practices:** **Ralph Nader's** book, *Unsafe at any Speed*, revealed that General Motors knew its Corvair was unsafe but continued to sell it. GM tapped his phone and hired prostitutes to entrap and compromise him. He sued GM and used his \$425,000 settlement to found The Center for the Study of Responsive Law and more consumer groups.

1962 Thomas Kuhn How science advances: **Thomas Kuhn** (1922-96) a physicist, published *The Structure of Scientific Revolutions*. He changed the way scientific progress was seen.
He introduced the concepts of *paradigms* and *paradigm shifts*. The then prevailing view of scientific progress was simply of incremental additions to the body of scientific knowledge through the *scientific method*. Facts contra the paradigm were ignored. Like, before **Copernicus**, sunspots weren't recorded. After **Copernicus** they were.
Kuhn said science advances through scientific revolutions, large and small, that changed basic assumptions or world views regarding a particular science, large revolutions like those of **Copernicus, Kepler, Galileo, Newton, Lavoisier, and Einstein**, and intermediate minor ones.

Paradigm shifts A *paradigm* is simply the current dominant prevailing theory, in any given science. During this phase, scientists normally have shared views regarding problems. Such *paradigm* is useful as it focuses experimentation. This phase can be called "normal science."
Kuhn A *paradigm shift* occurs when a new theory forces scientists to change their their way of looking at their science's issues. The new theory, the new *paradigm*, can solve problems within that science better than the old *paradigm*.

Science advances in three stages **Kuhn** said science progressed in three distinct phases, 1. pre-science, which developed its own world view, its *paradigm*. 2. a period within which the *paradigm* progressed productively (like 200 years of Newtonian physics) until anomalous results using that *paradigm* became apparent, which required 3. a new way of resolving the anomalies, i.e., a new *paradigm* (like **Einstein's** relativity), which subsumed period 2. The new paradigm then progresses within its *paradigm* until a new *paradigm* to solve new anomalies .
Kuhn **Aristotle's paradigm**, for example, was that *purpose* was the driving force in nature. It prevailed for a millennium. Scientists sought *purpose* in events. This distorted science. Similarly, saying Earth was the center of the heavens was comfortable for the Church, and lasted until **Copernicus** demonstrated its falsity. (**Weinberg** in 1988 critiqued **Kuhn's** thesis)

1962 Catholicism: Catholicism is Malta's state religion. Archbishop of Malta **Montebello** declared it a mortal sin (eternal torture in Hell) and to be banned from all sacraments) for any Catholic to vote for the Labor candidate for Prime Minister. Labor lost.

1962-65 Catholicism: **Pope John 23** convened the *Second Vatican Council* precisely to reject the monolithic centralized model of Canon Law adopted in 1917 for **Pius 10**. **John** wanted a collegial decentralized human community. It instituted many reforms, allowed more accessible liturgy allowed vernacular language to be used in Mass.

The guiding principle of the Church of the future was to be "a pilgrim people of God."
Vatican 2 did however reaffirm **Pius 9's** 1870 papal infallibility and confirmed all the actions of the *Council of Trent* (1545-1563, no compromise with Protestants).

1962 Slavery Slavery in the 20th century: In the 1950s, slave markets operated in Djibouti to supply slaves to the Arab Emirates. Mauritania and Sudan had slaves in the 1960s. In 1962, Saudi Arabia officially outlawed slavery, with limited effect, but the Wahabbist *extreme* subjugation of women continued.

- 1962 **Speech can be an action** Philosophy, language: **John L Austin** (1911-1960) Brit, developed two theories, 1. 'linguistic phenomenology, a peculiar method of philosophical analysis of the concepts and ways of expression of everyday language; and 2. That speech can be an action. Some things people say are in themselves actions, like Groom: *I do*. Jury: *Guilty*. Buyer: *Sold*
- Knowledge beats intellect** **J Richard Hofstadter's** *Anti-Intellectualism in American Life* distinguished between *intellect* (the critical, creative, contemplative) and *intelligence* or *practical experience (knowledge)*, of the self-made man, which has been valued higher. Knowledge is more useful than mere intellect.
- 1962 Political Theory: **John F Kennedy**, US president, "A nation that is afraid to let its people judge the truth and falsehood in the open market is a nation that is afraid of its people."
- 1963 **Black Holes** Astronomy: **John Wheeler (1911-2008)**, a prominent theoretical physicist, named bodies in space whose gravity is so great that light cannot escape their pull *black holes*.
- 1963 Epistemology: **Edmund Gettier** posited situations of *justified true belief* that are not *knowledge*, i.e., A believes X, but *doesn't know* why or how. B also believes X but he *knows* why or how. So B's belief is *knowledge* as it is justified. A's identical belief is not knowledge as it isn't justified. (Most people think they know why or how they believe something.)
- 1963 Epistemology: **Mao Tse-Tung** (1893-1976), "Where do correct ideas come from? Do they drop from the sky? No. Are they innate in the mind? No. They come from social practice and from it alone."
- 1963 **Arthur Miller** (1915-2005) American playwright, "When any creativity becomes useful, it is sucked into commercialism, and when a thing becomes commercial, it becomes the enemy of man." Rabbi **Sherwin Wine**, a founder of *Humanistic Judaism*, coined "Ignostic," that is, one who can't say if he's an atheist or a theist until a sufficient definition of theism or god is proposed.
- Eric Hoffer:** Philosophy: **Eric Hoffer** (1898-1983), American, stevedore, philosopher, said regarding Lord **Acton's** adage, "*Power corrupts.*" "*Power corrupts the few [only a few have power], while weakness corrupts the many.*" (**Adlai Stevenson** agreed: "Power corrupts, but lack of power corrupts absolutely.") **Hoffer** also, "*Absolute faith* corrupts as absolutely as absolute *power*. Hatred, malice, rudeness, intolerance and suspicion. . .are the fruits of weakness. The well-adjusted are poor prophets. Every great cause begins as a movement, becomes a business, and eventually degenerates into a racket." **Hoffer**, "It is easier to love humanity as a whole than to love one's neighbor. . . Thus blind faith is to a considerable extent a substitute for lost faith in ourselves."
- Absolute power or faith corrupts absolutely**
- 1964 **Transfer RNA** Biology: **Robert Holley, Marshall Nirenberg, and Har Khorana** isolated *transfer RNA* and determined the sequence and structure of alanine tRNA, the molecule that incorporates the amino acid alanine into proteins. This deciphering the genetic code in molecular biology was second only to discovering the spiral double helix structure of DNA in 1953.
- Racism: **Dante A. Puzzo** (1918-2004), American historian, "Racism rests on two basic assumptions: that a correlation exists between physical characteristics and moral qualities; that mankind is divisible into superior and inferior stocks. Racism, thus defined, is a modern conception."
- 1964 **Biology, Evolutionary: W D Hamilton** (1936-2000) Brit., professor, mathematically modeled the theory of kin selection, that is, we are genetically inclined to help kin more than strangers.
- 1964 **Law:** The basic meaning of the *First Amendment* is to protect uninhibited speech of public issues. The *Civil Rights Act* became law. **Lyndon Johnson** put **Thurgood Marshall** on the Supreme Court.
- Physics: Richard Feynman**, "I think I can safely say, Nobody understands quantum mechanics."
- 1964 **Branden: How we think** Philosophy, Epistemology: **Nathaniel Branden**, an objectivist (**Ayn Rand**). "All knowledge and all concepts have a hierarchal structure, based on more basic concepts, and ultimately on one's sensory perceptions. Only when one knows something is certain can one determine what is not certain, and only logic can separate the two. If one uses a concept, one must know and can not deny or contradict the more basic concepts it is based on."
- 1964 **Cognitive science: Peter Putnam** (1927-87), American **cognitive scientist and philosopher**, laid the groundwork for a revolution in cognitive science. With his **Unified Model of Mind:** He developed one of the earliest comprehensive frameworks to mathematically and logically model how the mind emerges from physical processes, aiming to bridge the gap between subjective consciousness and mechanistic brain science. His thinking became known to cognitive scientists in 1964, in the only work he published, but became well known only in the 1980's

The structure of the nervous system. Neurons are nerve cells.

89 billion neurons operate in the brain

Putnam explains how the brain works

He developed groundbreaking theories about the mind.

He was the first person to propose that the human brain develops on Darwinian principles

To explain, first, the nervous system. Neurons are nerve cells. The human brain has about 86B neurons and about the same number connecting and supporting cells. In vertebrates, most neurons are in the central nervous system. Some are in peripheral ganglia. Neurons have three functions.
1. Sensory neurons respond to stimuli like touch and sound and send signals to the spinal cord and then to the brain. 2. Motor neurons receive signals from the brain and spinal cord and control everything from muscle contractions to glandular output.
3. Interneurons connect neurons to other neurons in the brain or spinal cord.
Axons and dendrites are filaments extruding from neurons and connect with other neurons.
When multiple neurons are functionally connected together, they form a neural circuit.
A neuron contains all the structures of other cells such as a nucleus, mitochondria and additional unique structures such as dendrites which transmit signals. Plants don't have neurons. Glial cells are non-neuronal cells that support and regulate the nervous system.

How the brain works: An event (like a pin stuck in the leg) causes a random search of all the past actions associated with such event, i.e., actions encoded in neural networks. The brain calls up every previous action that has ever helped deal with similar pain in the past. How does it decide among all of those actions? It lets them play out in parallel - multiple neural networks firing simultaneously. Some of the networks will inhibit or undercut others.

The pathway that doesn't get undercut and manages to repeat and reinforce itself will garner up enough strength to excite a motor neuron and emit its associated act. It is a neural Darwinism "survival of the fittest" idea. So random search brings past history into parallel, lets neural chains compete, and then the winner (which wins by virtue of invariance) emits. The emitted behaviors form a linear chain, which is constantly broken up and brought into parallel inside the nervous system in order to decide on the next act in the linear chain. **Putnam** emphasizes that only that which makes a difference in determining the order of that chain can be perceived, or subjectively experienced.

Putnam developed groundbreaking theories about the mind, consciousness, and computation, positing that human intelligence is fundamentally different from "thinking" machines like the universal **Turing** computer. His work anticipated several modern ideas in reinforcement learning, induction, and the philosophy of mind, positing mechanisms whereby brains learn by creating new "general rules" through interaction with their environments. He called his insight *Neural Conditioned Reflex Principle* ("NCRP"). It enhanced *Hebb's Postulate* (See 1949), generalizing it to include strengthening *some* and inhibiting other neural pathways.

His NCRP showed the critical importance of the dominating and inhibitory activity of different neural pathways in the nervous system in the making of the pathways' relative dominance whose excitation leads to the emission of behavior. No stable neural pathways or circuits of relative dominance (with their associated learned behavior) could ever emerge without the fundamental activity of inhibition within the nervous system as the source of self-regulation of neural circuitry.

His key ideas in cognitive science center on his original theory of the mind as an "induction machine"—a computational system fundamentally guided by Darwinian self-organizing principles. Hebbian learning rules (ref. 1949) were expanded to include inhibitory plasticity, resulting in networks that better suppress irrelevant representations and generalize task-relevant memories, reflecting **Putnam's** logic that inhibitory selection refines and strengthens adaptive brain circuits

Putnam argued that the human mind operates not through simple deduction on fixed rules (as **Turing** computers do) but by generating new rules through interactions with the environment. His nervous system model provided an elaborate and detailed explanation of the interaction between both positive and negative facilitations (attractions and repulsions) within the nervous system that result in differing patterns of neuronal activity that lead to learning of new behaviors and the ever-increasing complexity of the organization of the nervous system and of its effective behavioral emissions in the widest variety of environmental contexts.

He applied self-organizing Darwinian logic to neural activity, proposing that the brain is a competitive arena where neural pathways (analogous to Darwinian species) undergo random variation and selection. As the mind (with interconnected neurons) experiences events, by repetition certain neural circuits emerge dominant because they work best and others wither from this interplay. They result in learned behaviors. That is, by the repetitive use of certain successful neural paths, they became strong and edge out unsuccessful neural paths.

He claimed that his system will learn its sequences of moves and will create rules for itself how to behave in a given situation. It adapts, through experience *learns* which moves/neural pathways are successful. Learning arises as these loops develop through trial and error and contradictions between learned rules are resolved by discovering new variables-fueling intellectual growth and adaptation. (Signals between neurons communicate electrically within a neuron and

chemically between neurons.)

He said that subjective experience and consciousness should be explained mechanistically grounded in the physical operations of neural circuitry, but he acknowledged the difficulty of reconciling internal experience with objective scientific models.

The basic operation of the nervous system may be regarded as the establishment of relative dominances (RDs) or stable rules of choice in a subset of competitive factors. Called a random search. The basic criteria to establish a relative dominance is that it serves to stop the random search or defines a repetitive pattern.

The dichotomy of mind and brain is the oldest and most basic problem in cognitive science.

His insight: What is perhaps most original in his work is that he tried to place our subjective experience of consciousness – everything we tell ourselves about our "selves" – in the context of a mechanistic view of mind which sees it arising out of electrical interactions governed by the laws of physics, chemistry, etc.

The dichotomy of mind and brain (**Descartes's** mind-body dualism) is the oldest and most basic problem in cognitive science.. The challenge he addressed is this subjective experience of ourselves consistent with the idea that we are embodied in a very special type of self-organizing neuro-biochemical machine operating in accordance with the laws of physics.

His model of the nervous system had antecedents, like **Hebb's 1949 Postulate**, and also the whole class of experimental findings of the neuroscience of his time. However, he was the first to begin the construction of an overall functional model of the operation of the nervous system. The accumulating evidence from the neurosciences continues to confirm the broad outlines of his model.

Putnam

For true induction, the process itself should create its own goals. And there was a key constraint: he realized that the dynamics he had in mind would only work mathematically if the system had just one goal governing all its behavior.

That's when it hit him: The goal is to repeat. Repetition isn't a goal that has to be programmed in from the outside; it's baked into the very nature of things—to exist from one moment to the next is to repeat your existence.

"This goal function," he wrote, "appears pre-encoded in the nature of being itself."

But the real magic happens when a contradiction arises, when two previously successful rules, called up in parallel, compete to move the body in mutually exclusive ways. A hungry baby, needing to find its mother's breast, simultaneously fires up two loops, conditioned in from its history: "when hungry, turn to the left" and "when hungry, turn to the right." Deductive logic grinds to a halt; the facilitation of either loop, neurally speaking, inhibits the other. Their horns lock. The neural activity has no viable pathway out. The brain can't follow through with a wired-in plan—it has to create a new one.

Putnam

Just as **Turing** had worked out an abstract, universal model of the very possibility of computation, he worked out an abstract, universal model of the very possibility of mind.

It was a model, he wrote, that "presents a basic overall pattern [or] character of thought in causal terms for the first time." The best exposition of his thoughts was *On the Origin of Order in Behavior*, his random search and relative dominance within the nervous system and Darwinian natural selection are fundamentally the same.

Modern neuroscience has validated several aspects of **Putnam's** inhibitory-selection ideas through both experimental and computational approaches, especially in learning, decision-making, and memory systems. Notably, inhibition is reduced just before animals receive rewards, allowing key circuits to activate and learn effectively—a direct parallel to **Putnam's** concept that selective inhibition enables learning by allowing new neural loops to form and take over existing pathways.

The downside of Biblical fundamentalism

Fundamentalists frightened Senator Goldwater

Christianity: **Barry Goldwater**, Episcopalian, prominent conservative, US Senator, Republican candidate for president, pointed out the basic harm to society of a literal belief in biblical verses, "Mark my word, if and when these [Evangelical] preachers get control of the [Republican] party, and they're sure trying to do so, it's going to be a terrible damn problem. . . . Frankly, these people frighten me. Politics and governing demand compromise. But these Christians believe they are acting in the name of God, so they can't and won't compromise. I know, I've tried to deal with them."

More recently, **John Simkus**, an Evangelical Christian, when he was chairman of the Congressional committee responsible for the threat of global warming, stifled bills to reduce global warming citing the promise of the *Second Coming* in the Gospels.

He said, The Earth will end only when God declares it.” A 2010 Pew poll found that 58% of white Evangelicals say **Jesus** will surely or likely return by 2050. Finally.

1964-65 **Big Bang** Physics, Cosmic microwave background radiation: (“CMB”) was detected by **Arno Penzias** and **Robert Wilson** at Bell Labs. In 1965, they realized that it was a remnant of the *Big Bang* that **Gamow, Alpher, and Herman** had predicted in 1948. Thus there were then three bases for accepting the *Big Bang* theory. 1. **Hubble’s** law. 2. CMB radiation from the *Big Bang*, and 3. calculating galaxies’ expanding speed backward gives the age of the oldest stars, c.13 billion years. Other support for *Big Bang* came from its accurate predictions of the abundance of light elements in the cosmos such as hydrogen and helium. (*Big Bang* vs. *Steady State* model was convincingly decided in 1992)

1965 Political Theory, revolution: **Ernesto “Che” Guevara** (1928-67), a medical doctor, Argentine born, a major figure in the Cuban revolution, said, “If one plays by the rules, he gets all the honors—such honors as a monkey might get for performing pirouettes. The condition that has been imposed is one that one cannot try to escape from the invisible cage.”

1965 Philosophy: **Philip Wylie** (ref. 1942), “Why are conservatives consistently mistaken? Why have their position papers and educated guesses come so many ghastly croppers that one might achieve their bracket by following a single inviolable rule: Whatever the conservatives do, or believe, or predict, DON’T. Not that I’m a liberal, or even subject to any such condition.”

1966 **Hick defined the Christian God** Theodicy: **John Hick** (1922-2012), eminent Christian theologian, wrote *Evil and the God of Love*. He defined the Christian God. “God is the unique infinite personal Spirit who has created out of nothing everything other than himself, He is uncreated, omnipotent and omniscient; and his attitude toward His human creatures whom he has created, whom he has made for eventual fellowship with himself is one of grace and love.”

How Hick justified suffering He admitted, “Some sufferings, like imbecility, disease, earthquakes, plague, are apparently unmerited, pointless and incapable of being morally rationalized. But, to justify such sufferings, he argued, “The sufferings create sympathy among men and evoke the unselfish kindness and goodwill which are among the highest values of personal life.”

This is theology at its most inventive. That is, the horrible, pointless, ugly, painful suffering of an unknown number of people is okay simply as it *might* cause some other persons to be nicer. God’s “goodness” under this reasoning would be compatible with any horrible suffering. His *Evil and The God of Love*, also said that God created the world and that it was good; evil is merely a consequence of the fall of man.

Suffering assists one’s spiritual growth A possible theodicy: **Hick’s** *Evil and the God of Love* also argued that it would be acceptable if God allowed men to sin and cause someone’s suffering *if* God’s purpose was not to make the world a “permanently hedonistic paradise” but a place for “soul-making” where all would suffer and thereby become “children of God” worthy of Heaven. To his credit, he honestly admitted it was a speculation. Other theologians are more sure that they know God’s motives and purposes. He didn’t think it was God’s job to make the world a pain-free environment.

Hick He said **Mackie’s** argument, i.e., making humans who would not sin, isn’t possible as that would mean they would be mere mechanisms, passively acting out God’s will. “Without evil and suffering of some people, moral traits such as courage, patience, and sympathy among them could not develop.”

Evil and the God of Love **Hick’s** argument is the usual *free will* excuse given for God not protecting victims of evil-doers causing suffering. **Hick’s** speculation fails at least six ways: 1. It is the logical fallacy of a false dilemma. In fact there are usually many choices man can make morally without being a mechanism. 2. Much suffering like dying of terminal cancer or severe torture is so debilitating, so severe (death, disease), that the sufferer couldn’t develop the required moral stature for soul making. 3. Animal and infant suffering do not serve any soul-making purpose.

Hick 4. Saying that the only alternative to having evil is for there to be a “permanently hedonistic paradise” is a straw argument (like **C S Lewis’s** assertion that people want to be “perfectly happy”). “Good-acting” people would not lose their ability to differ in many ways which may cause other persons to feel discomfort or unease far short of suffering. 5. Saying God couldn’t make “good-acting” people says God is not omnipotent (**Mackie’s** argument). 6. It’s illogical that someone must suffer to make other humans develop good character.

1966 **Hick** admitted that it does not always work out but that such God would make it up in the afterlife. This is wishful speculation for a God who couldn’t do it properly in the first place.

Hick said a theodicy doesn’t claim to explain all evils. It “only points to certain considerations

which prevent the fact of evil and suffering from constituting a final and insuperable bar to rational belief in God.” But, a theodicy that doesn’t justify all evils and sufferings is irrelevant and not credible. **Hick** said that Christianity is the only way to true salvation; and that the *Sermon on the Mount* was the basic Christian teaching. See **Hume’s** 1751 refutation of the *free will defense*.)

Hick Dogma: **Hick** was better known as an advocate for pluralism. He could not understand why good persons with differing religious views would be condemned to Hell simply for not being Anglican.

He reasoned that as people were born into different cultures, for example, places where Anglicism was unknown, they would naturally develop different religions.

He argued that religions were but different paths to the one transcendent reality, God.

Hick’s tolerance was heresy **Heresy:** For this reasonable and charitable ecumenical view, he was twice accused of heresy by the Anglican Church. He was also attacked by then Cardinal **Ratzinger** (later Pope **Benedict 16**). The clergy were right. It is ‘heretical’ for Christians to assert other religions are valid like theirs. Who this reflects badly upon, the church or the heretic, is the question. **Hick** became a Quaker in 2009.

1966 Catholic Index of Prohibited Writings An updated *Catholic Index of Prohibited Writings* was published. It listed 4,000 writings. **Hitler’s *Mein Kampf*** had been examined but not put on the *Index*. In its early years, the *Index* had greatly retarded scholarship for Catholics. In the 20th century the *Index* was an embarrassment. It was quietly abandoned in 1978, but Cardinal **Ratzinger** said in 1985 that it still retained moral value “for the more unprepared faithful.”

Green Revolution tripled cereal grain yield **Agriculture: Norman Borlaug** (1914-2009), American plant geneticist, was principally responsible for the *Green Revolution*, which saved hundreds millions of persons in Asia, Africa, and Mexico from starvation. He developed a dwarf, disease-resistant wheat and other cereals (rice, sorghum, cassava) and planting systems which ultimately tripled global cereal grain yield. Nobel Peace Prize 1970

1966 **Philosophy: Simone de Beauvoir**, “It is easier to think of a world without a creator than a creator loaded with all the contradictions of the world.” “There is only one solution if old age is not to be an absurd parody of our former life. That is to go on pursuing ends that give our existing a meaning,”

1966 **Political Theory: Noam Chomsky**, professor at MIT famous as a linguist (1957), became a powerful political liberal voice with an essay, *The Responsibility of Intellectuals*, severely criticizing academics who were more interested in cosying up to power than speaking truth to it. He has stayed the most influential academic critic of American political and military violations of international law.

1967 **Sociology: Peter Berger and Thomas Luckmann:** wrote *The Social Construction of Reality*, a treatise on the sociology of knowledge. They introduced the term *social construction* into the social sciences. Their central concept: people and groups interacting in a social system, over time, create concepts or mental representations of each other’s actions, and that these concepts eventually become habituated into reciprocal roles played by the actors in relation to each other. When these roles are known to other members of society to enter into and play out, the reciprocal interactions are institutionalized. In the process, meaning is embedded in society. Knowledge and people’s conceptions (and beliefs) of what reality is become embedded in the institutional fabric of society. That is, reality is *socially constructed*.

1967 **Philosophy: Jacques Derrida** (1930-2004), French, a *post-structuralist* thinker, posited *deconstruction*, a way to criticize philosophical works which attempt to expose the hierarchies and paradoxes underlying such works. When language expresses an idea, it changes it. Reality is relationships rather than things.

1967 **Theology: Antony Jay** (1930-2016), Brit., “In corporation religions as in others, the heretic must be cast out, not because of the probability that he is wrong, but because of the possibility that he is right.”

1968 **Philosophy: Herbert Marcuse** (1898-1979), German American philosopher, “It is not the idea of God that has been an obstacle to human liberation, but the use that has been made of the idea of God.” “Law and order are always and everywhere the law and order which protect the established hierarchy.”

1968 The Durants’ Lessons of History. Freedom and equality are sworn & everlasting enemies. History has Historians **Will and Ariel Durant** (ref.1938) published *The Lessons of History*. Namely: Religions: History has justified the Church in the belief that the masses of mankind desire a religion rich in mystery, miracle, and myth. Excellence: “We are what we repeatedly do. Excellence, therefore, is not an act, but a habit.” Education: is a progressive discovery of our own ignorance. Tolerance: grows only when faith loses certainty; certainty is murderous. The Christianity of Europe and America: was the last great creation of the ancient pagan world. Culture: “Circumstances, geographical, economic, and political create a culture, and the culture creates a human type.

justified the Church's belief that the masses of mankind desire a religion rich in mystery, miracle, and myth."

The customs or institutions of one's society are the fruit of generations enduring centuries of experiment
Wealth: "The concentration of wealth is natural and due to the inequality of ability." (To do good or bad)
Freedom and equality are sworn and everlasting enemies and when one prevails, the other dies.
Government: Eliminate "government regulation and humans' natural inequalities will multiply almost geometrically, as in England and America in the 19th century under *laissez faire*."
Inequality of people: "Even when repressed, inequality grows; only men below average in economic ability desire equality. Those . . . of superior ability [to make money] desire freedom [from government regulation]; and in the end, superior ability has its way. . .
Every greater complexity of the economy puts an added premium upon superior ability and intensifies the concentration of wealth and political power.
"Promoting equality: To check the growth of inequality, the liberty of some must be repressed.

Nine factors that have diminished religion

The **Durants** named nine factors that have diminished the power of religion. 1. "Education spawns doubt about religion. 2. Awareness of man's insignificant place in the cosmos. 3. The emergence of the multitude of Protestant sects with conflicting dogmas. 4. The deistic exposure of *Bible* miracles. 5. The Protestant exposure of Catholic miracles. 6. The exposure of religions' frauds, inquisitions, massacres. 7. *The Enlightenment*. 8. The bold advance of skeptical scholars. 9. The triumphs of scientific technology.

1968 Physics: **Max Born**, (ref. 1926), physicist, "science . . . is so greatly opposed to history and tradition that it cannot be absorbed by our civilization." "The human race has today the means for annihilating itself."

There are only three fundamental forces. They govern everything that happens.

Physics: **Steven Weinberg** (1933-2021), (ref. 1847), an eminent MIT physicist, said that the weak interaction (weak nuclear force) and the electromagnetic force were identical, and that the apparent differences between them were due more to the low temperature of the universe than to anything fundamental to their nature. Predictions made on the basis of his theory proved accurate, and it is now generally accepted. This cut the four known fundamental forces (1. Gravity, 2. the weak nuclear force, electromagnetism, and 3. the strong nuclear force.) to three
These forces govern everything that happens in the universe. **Weinberg, Sheldon Glashow, and Abdus Salam** shared the **Nobel** prize for the set of equations establishing this idea.

For good people to do evil takes religion.

Weinberg said, "The more the universe seems comprehensible, the more it also seems pointless." The search for the "theory of everything" continued. There are several hypotheses seeking to unify the now three fundamental forces. He also said, "Good people do good things. Evil people do evil things. But for good people to do evil things; that takes religion."

Murray Gell-Mann (1974) said the use of "theory of everything" was a misnomer, not a criticism of the search itself, as such a theory would include all possibilities and "it doesn't include these zillions and zillions of accidents that along with basic law determine the history of the universe."

1968 The Catholic God's attributes

Catholicism: Pope **Paul 6's** (1897-1978) (pope 1963-78) encyclical *Humanae Vitae* reaffirmed the Catholic prohibition of contraception. It was ignored by two thirds of Catholic women.

The National Catholic Almanac said God is almighty, eternal, holy, immortal, immense, immutable, ineffable, infinite, invisible, just, loving, merciful, most high, most wise, omnipotent, omniscient, omnipresent, patient, perfect, provident, supreme, true, and, contradictorily, *incomprehensible*. This is Catholicism's perfect God. The *Qur'an* has 99 praiseworthy adjectives for its Allah (see 650).

1969 Paleontology, biology: A meteorite over 4.5 billion years old was found in Australia which contained 74 different amino acids, 8 of which are involved in making Earthly proteins. An American walked on the Moon.

Sociology, Chaos theory: **James Yorke** and **Robert May**, mathematicians, developing a model for population growth using a "logistic equation" (where results are put back into the equation), found that small changes in a particular variable caused either better predictions or wildly unpredictable ones. But even the chaos showed repeated patterns.

Philosophy: **Paul Feyerabend's** *Against [the scientific] Method*. "As there are no methodological rules always used by scientists, limiting activities of scientists to any single prescriptive method restricts scientific progress." "To insist that a new theory be consistent with an older theory gave an unwarranted advantage to the old theory. Science is just another form of belief." [So is reading tea leaves.] He also said the Church in 1632 was more faithful to reason than **Galileo**.

1970 Earthquake is a punishment from God

Christianity: An earthquake killed 80,000 Peruvians and made 1M homeless. Author **Barbara Bode** interviewed hundreds of survivors. All said it was a punishment from God. Some blamed improper sexual conduct. Some blamed the idolatry of Catholics. Some blamed the US for putting a man on the moon. Some were proud to be chosen as sufferers.
Not one said it was a natural occurrence.

1971 Political Theory: **John Rawls** (1921-2002), an American political philosopher, published *A Theory of*

Rawls transformed political philosophy.

Justice is fairness.

Justice. It argued that justice was fairness. A just society would distribute responsibility, work, hardship, and wealth fairly; to deviate from this only to make the least advantaged better off.

To achieve a truly good and fair society he asked what kind of governmental we would we set up if we didn't know if we'd be rich or poor, artist or businessman, in the nation we were establishing.

What was unique about this was that it was not based on any moral or ethical rules.

It transformed political philosophy. Within a decade over 2500 books and articles were written about its central theme. His liberal theory of justice continues to dominate political philosophy and liberalism.

His infantry experience in WW2 turned him from theology to political philosophy to replace the God he felt had abandoned him..

- 1971 Biology, evolutionary: **Robert Trivers** (1943-) published a series of influential papers in evolutionary biology. His first major paper, "*The Evolution of Reciprocal Altruism*", suggested that reciprocal altruism, the expectation of mutual benefit, was the solution to the longstanding issue of cooperation among unrelated individuals. A morally grounded society tends to thrive. Religions of course promise eternal bliss to those who practice kindness. (**Dalai Lama**, Buddhist, "My religion is kindness.")

- 1971 Women's rights: Swiss women could vote for the Federal Assembly. In 1990 the last canton to do so allowed women voting. See 1920 for the year that several countries permitted women voting.

- 1972 Evolution: **Stephen Jay Gould**, (1941-2002), (ref 1859, 1900-'39, '72, '97), US paleontologist, and **Niles Eldredge** (1943-), US biologist and paleontologist, coined the phrase *punctuated equilibrium*, to describe the fact that *physical* evolutionary changes in species were rare and that no-change for long periods, even with climate changes, was the norm. (Recall **Bronowski**: *Cultural* changes are quicker)

- 1972 Physics: National Bureau of Standards says the speed of light is 299,792.4562±1 Kps.

Life adapts to the universe, not vice versa.

- 1973 Biology: Several species of fish were found living off heat and minerals spewing from vents deep in the sunless Atlantic. Over millions of years, a species of sea turtles evolved large 400 lb fat deposits and a metabolism to migrate 1,250 miles over two months without food every year from Brazil to Ascension Island in the Mid-Atlantic to lay eggs. Ascension adjoined Brazil millions of years ago and drifted away.

- 1973 Physics: **Edward Tryon**: (1940-2019), US physicist, was the first to posit that the universe may be a random *quantum fluctuation* in a vacuum, so could have started from nothing. Cosmologists have various hypotheses that allow for the universe to have begun from nothing for no reason.

Astronomy, Gamma-Ray bursts: US military *Vela* satellites detected rare gamma-ray bursts in galaxies billions of light years away, the brightest electromagnetic events known. It was thought to be a supernova collapsing into a neutron star, a quark star, or black hole. It could release as much energy in seconds as our Sun has released in 10 Billion years.

1970s Dark matter posited

Astronomy, dark matter: **Vera Rubin** (1928-2016), American astronomer, saw the *Andromeda* galaxy and 60 other spiral galaxies were rotating faster than their visible (thus presumed) mass could gravitationally keep them from flying apart due to the centrifugal force of their rotation. So she inferred that there was some invisible matter with gravitational force in such galaxies holding them together, (Recall **Zwicky** in 1933 wrote about this issue. He called the presumed gravitational force *dark matter*).

Rubin calculated the presumed mass and thus gravitational attractive force of the galaxies from their brightness and the Newtonian calculation for gravity. To detect dark matter, scientists look at its indirect effects on gravity and how it impacts other objects with mass and light. For example, dark matter deflects cosmic microwave background radiation (CMB). (In the 1950s Princeton had rejected **Rubin** for an astronomy doctoral program explicitly and solely as she was a woman. Princeton had no female full professor until 1959.) (More **Rubin** p. 436)

1973 The universe was made for man

Theology: **Brandon Carter** (1942-), Australian theoretical physicist, posited the *Anthropic Principle* a/k/a *Argument from Fine Tuning*, for a God, a variant of the *Deist Argument*. **Carter** defined two forms of the *Anthropic Principle*, a "weak" form ("*WAP*") dealing with where our planet is in the cosmos, and a "strong" form ("*SAP*") dealing with the fundamental constants of physics at the *molecular level*.

The *Principle* says that all the universal constants and seemingly incredible coincidences and unlikely enabling conditions for life to exist on Earth *infer* that only a divine power could have caused them and such power did so in order to produce humans (hence "anthropic."). (ref. 1961- **Dicke** for this argument's first iteration)

The Anthropic Principle

The *Anthropic Principle* thus accepts Darwinian evolution and rejects *Genesis*; God just established all the proper constants for our universe and then let it evolve according to the natural laws he devised, like *deism*. This denies Christianity, Islam, Judaism, as they believe in miracles.

WAP, the planetary form of the argument, says life on Earth exists only as Earth has the following

Weak Anthropic Principle

1973

characteristics: 1. the proper diameter, 2. a molten magnetic core (to repel deadly cosmic radiation), 3. chemical elements in the correct proportions, 4. a moon the correct size to prevent Earth from wobbling like a dying top, 5. a star/sun of the proper size, 6. the certain age of the universe that permits and has liquid water [Our carbon-based kind of life needs liquid water], 7. an orbit that is a certain specific distance away from the Sun/star in what can be called a Goldilocks Zone (as in, not too hot, not too cold, but just right.)

Planets that are further from our Sun, Mars and others, are too cold, planets closer to our Sun, Mercury and Venus, are too hot. Earth's orbit is an ellipse and is so close to circular it doesn't go beyond its Goldilocks Zone. All these seven conditions are in their own Goldilocks zones.

Strong Anthropic Principle

Strong Anthropic Principle (SAP), the molecular form of the argument, says that there are six fundamental constants of physics that have to be within certain narrow parameters for life to exist.

They include the strength of the strong nuclear force (the force that binds the components of an atomic nucleus) The gravitational attraction between stars. If such attraction were not many orders of magnitude weaker than their electrical repulsion, stars would have collapsed long before the nuclear process could build up all the elements from the original hydrogen.

Mark Ridley

If the carbon "resonance" were 4% lower, carbon wouldn't form in first place. And, there is an extremely delicate balance regarding the amount of CO₂ in the atmosphere. These are accepted laws of nature. They are called *anthropic* coincidences, although *human* life is no more improbable than any other life. Oxford zoologist **Mark Ridley** suggested that the origin of the eucaryotic cell, (with a nucleus and other complicated features such as mitochondria) was an even more momentous and statistically improbable step than the *origin* of life.

A logical God wouldn't create a universe this way

1973

There are several problems with this theory for religious believers, namely: 1. It's not logical. It basically says that c.13.8 billion years ago, a supernatural entity created the universe so immense that our most powerful visual telescopes, and the even more powerful radio telescopes, can't detect more than a fraction of its hundreds of billions of *galaxies*. One medium size galaxy is our *Milky Way*, which holds 100-400 billion suns including our Sun and c.100+ billion planets. Then our Sun formed billions of years after the *Big Bang*. Then, around nine billion years after the *Big Bang*, c.4.6 billion years ago, space dust coalesced into our Earth, smaller than a dot in our tiny solar system.

The only life on Earth for 3 billion years was a one celled bacteria. Every species began from one baby

Then, a billion years later, life, a one-celled organism evolved in a watery environment. For *three billion* years this one celled organism was the only life on Earth. Then multi-celled organisms evolved. Some multi-celled organisms left their watery environment and evolved into land based plants and animals. Billions of years later they evolved into primitive land animals and some evolved into primates. Millions of years later they evolved into *hominims*. For seven million years *Hominims* lived with "no arts, no letters, no society; and which is worst of all, in continual fear and danger of violent death, and life was "solitary, poore, nasty, brutish, and short," in fear, disease, privation, ignorance (**Hobbes**) About 200,000 years ago *Hominims* evolved into Modern man. species evolved from just one baby by means of a random genetic mutation.

A long illogical way for a God just to produce humans

That's a long cruel illogical way for an omnipotent God to go just to produce humans, and it's precisely the way the world would have evolved were there no God. **John Stuart Mill** had said in 1874, "If God is omnipotent, he could have created the universe and humans in an instant." If a God created the universe to make humans, why take so long? Why create 100 trillion trillion other stars and their planets? Would not a God snap his fingers and create in an instant more models of moral goodness and an animal kingdom not dependent on the savage death of most creatures?

Assumes carbon based life

2. Unproven assumption: The *Anthropic Argument* assumes that carbon-based life is the only possible form of life, an unproven assumption. Bacteria live two miles undersea living off the radioactive decay of nearby rocks. Plants and animals live in the Atlantic far deeper than the Sun reaches exist on bacteria fueled by hydrogen sulfide. Complex communities of microbes live in the superheated acidic water in the Dallol crater in Ethiopia.

Microbes have been found that eat and breathe electricity. Multi-celled creatures named tardigrades have lived in the vacuum of space at temperatures just above zero **Kelvin** and at pressures of the deepest ocean trenches and at deadly levels of radiation.

God by default Argument

3. The argument has all the defects of *the Design Argument*, i. e., who designed the creator, who designed the creator's creator, *etc.*; false dilemma (chance or creator, no alternatives allowed); cruel world implies incompetent or evil designer; possible multiple designers; faulty analogy, doesn't infer anything about the designer's nature or purpose or value system, not falsifiable; and illogical, as shown above in problem 1.

John Earman

4. Nothing new: Philosophers of physics **John Earman** and **Ernan McMullin** and other critics have simply said that the fundamental physical constants do not allow one to explain or predict anything that we did not already know, that the SAP and WAP (Earth's time-place in the cosmos)

1973 are tautologies, statements true by virtue of their logical form (the conclusion is identical to the premise) and not because of a substantive claim made and supported by observation of reality, i.e., simply a way of saying, "If things were different, things would be different."

5. Three of the six claimed "fine tuned" constants aren't constants, **Boltzman's** constant, **Newton's** gravitational constant, and **Planck's** constant are merely conversion factors.

6. SAP is not testable or falsifiable, and thus not a scientific statement, but simply a speculation.

Evolution,
life adapts
to nature,
not
vice versa

7. **Victor J Stenger** (1935-2014) American particle physicist and philosopher, argued that the "constants" don't have to be so finely tuned to permit life to evolve. And life evolved by *Natural Selection* where the physics of the environment determined what kind of life survives & reproduces, i.e., all life, from bacteria to elephants, adapts to the laws of nature, not the other way around.

Physics does not adapt to life, as the *Anthropic Principle* contends. "Our universe is not fine tuned for us. Unfit new species just die. We and all life are fine tuned [by natural selection] to our universe." **Stenger's** book *The Fallacy of Fine Tuning* has also more technical arguments.

8. God is more improbable: As the constants make life improbable (which they certainly do), then the *God hypothesis* to such set of circumstances is more improbable, as the god who did the designing would have to be more intelligent than the things he was designing, i.e., more improbable.

Plus, that any one of the modern gods, Catholic, Jewish, Muslim, Pentecostal, Jainism, etc., is the one true God, would be yet even more improbable. The current successful standard cosmological model of the universe has three actual constants, none have to be "fine-tuned."

Richard
Dawkins

9. **Richard Dawkins** (1941-), Brit, evolutionary biologist, atheist, says biologists and cosmologists agree that a natural explanation for life is *extremely improbable*, but *possible*. **Dawkins** distinguished between the origin of life from non-living matter, *abiogenesis*, from the evolution and development of species once even the most primitive life exists, two completely different phenomena.

(NASA unofficially defines life as a "self-sustaining chemical system capable of Darwinian evolution." Scientists at Purdue have found that amino peptides can spontaneously generate in droplets of water during the quick reactions that happen when water meets the atmosphere, such as when a waterfall crashes down.

Random gene mutations, time, and *Natural Selection* fully explain the development / evolution of all species once life itself exists. So, the only real unknown re living matter, is its origin, *abiogenesis*.

There is yet
no generally
accepted
theory for the
origin of life.

Abiogenesis is the natural process by which life arises from non-living matter, such as simple organic compounds. While the details of this process are still unknown, the prevailing scientific hypothesis is that the transition from non-living to living entities was not a single event, but a gradual process of increasing complexity that involved molecular self-replication, self-assembly, autocatalysis, and the emergence of cell membranes.

Although the occurrence of *abiogenesis* is not controversial among scientists, there is not yet a generally accepted theory for the origin of life. No theory is yet considered knowledge.

1973 Psychology: **Daniel Kahneman** (1934-2024) and **Amos Tversky** (1937-96), Israelis, and others established a cognitive basis for common human errors that arise from heuristics, aphorisms, and biases. (In 1971, in a published paper they had approved of the "*Law of Small Numbers*" which let researchers draw conclusions from small samples of people. They corrected it. (More 1975, '79-80, p.399

Standard
model of
particle
physics

1974 Physics, Particle physics: Physicists agreed on which particles are the fundamental particles that make up all matter. Theoretical and experimental developments were summarized into the *Standard Model of Particle Physics*. It was published. It is the theory describing three of the four known fundamental forces (the electromagnetic, weak, and strong interactions, and not including the gravitational force) in the universe, as well as classifying all known elementary particles.

It was developed in stages throughout the latter half of the 20th century, through the work of many scientists around the world, with the current formulation being finalized in the mid-1970s upon experimental confirmation of the existence of quarks.

This *Standard Model* is meant to explain various physical phenomena. It is not fixed, as further advances may find more particles or more about the interactions among particles

In 1974, for example, when physicists agreed on the *Standard Model*, the existence of quarks was confirmed, but not all 61 particles of the current *Standard Model* had been found. Some were merely theorized based on what they should be like to fit into the *Standard Model*. Quarks have fractional electric charges, **Murray Gell-Mann** (1929-2019), "Quarks are "the basic building blocks of all matter."

1974 The *Standard Model* does not deal with dark matter, gravity, or dark energy (not even thought

- The limits of the Standard Model.** of when the *Standard Model* was being formulated) to enable action-at-a-distance, like gravity. Tiny packets of energy (quarks and leptons) result when quantum principles are applied to fields. One criticism of the *Standard Model* is that it ignores gravity & requires that particle masses, charges, and other properties be measured experimentally in order to be substituted into the equations.
- 1974 Alvin Plantinga's defense against the Problem of Suffering** Theodicy: **Alvin Plantinga** (1932-) (ref.1965), a well known current Christian theologian, published several arguments for the existence of the Christian God. The better known ones are mentioned in this chronology. In 1974, he published *God, Freedom, and Evil* to refute the *Problem of Suffering* as expressed by **John Mackie** in 1955. He revised it in a few months as *The Nature of Necessity*. He revised it again in 1977. He offered not a theodicy, i.e., actual reasons how a perfect God could co-exist with evil and suffering, but a *defense* which, as we have noted, does not have to be true, or even plausible, or even likely, just theoretically *possible* under certain circumstances. At 1977, we discuss his 1977 version as presumably it is his best argument.
- 1974 Astronomy: Stephen Hawking** (1941-2018), American physicist and cosmologist, said that black holes aren't forever black as they would evaporate in billions of years. (more **Hawking** 1983, '87, '92, 2010, '12)
- He said, "There is something infantile in the presumption that . . . God has a responsibility to give your life meaning. There are passages of the Judeo-Christian *Bible* which no modern Christian or Jew would consider right or fair. The story of **Isaac's** narrowly averted sacrifice by his father **Abraham** strikes us moderns as a shocking piece of child abuse."
- Women are genetically different?** The study of evolutionary biology posits that millennia of different roles in society between the sexes, i.e, different environmental circumstances, made women genetically *different* (not better or worse) than men. Thus men and women are now hard wired to think differently. **Hawking** argued that evolution meant progress.
- 1975 Man beats machine** Viet-Nam War: Communist North Viet-Nam defeated South Viet-Nam and the US. 77,000 US soldiers died unnecessarily. (Total war deaths c.1.3M) North Viet-Nam with its ideology of independence and \$5 bicycles defeated the US with tanks, agent Orange, total air and weaponry superiority, and \$15 million airplanes. **Mao Tse Tung** had said that the decisive factor in warfare was man, not material. (ref. 1928)
- Social Darwinism** Sociobiology: revived *Social Darwinism*. It presented evolution as the ultimate theory, the convergence of all knowledge. This rejected **Locke's** concept of the mind as a *tabula rasa* and echoed **Kant's** theory that the mind possesses inherent abilities to understand and **Francis Bacon's** "idols of the mind" (ref.1624). **Marx** said social class determined a man's destiny. **Freud** had said it was anatomy, the *Oedipal* drama in the family.
- 1975 What is science?** Sociobiology: **Edward O Wilson**(1929-2021), recipient of over 150 prestigious awards from institutions worldwide, defined science as the organized systematic enterprise that gathers knowledge about the world and condenses the knowledge into testable laws and principles. Unlike pseudoscience it is repeatable, economic, and measurable. His book *The Diversity of Life*, described the brutality of nature.
- Similar syntaxes worldwide infers an universal grammar.** Linguistics: **Noam Chomsky** (ref. 1957), a prominent linguistics professor, published *The Logical Structure of Linguistic Theory*, extending his theory that the similarities among the world's languages' syntaxes are too close to be mere coincidence. He concluded that there's an innate *universal grammar* (namely subject-verb-object) helping children to learn language. In other words, there's a quality in the brain that thinks according to such *universal grammar*.
1975 He has theorized that other types of knowledge also benefit from innate qualities in the brain. He gained greater fame, however, as a social critic.
- People decide using heuristics** Psychology, economics: **Amos Tversky** and **Daniel Kahneman** (ref. 1973), Israeli psychologists, introduced *Decision Theory* (how people make decisions), both ideally and rationally and how in real life decisions are made). There is much evidence that irrelevant circumstances can affect judgement. It was a sea change in economics whose *paradigm* was that people act rationally. **Tversky** and **Kahneman** said people decide by using rules of thumb, *heuristics*.
- 1975 Example of a heuristic** An illustration of the *representativeness* heuristic is called the *Linda problem*. Imagine a woman named Linda who is outspoken about social justice. She is a bank teller. What is more likely, that Linda is active in the a feminist movement and a bank teller or that she is not a bank teller. Most people pick the feminist and bank teller, but in truth, that is less likely, as the more specific a description is, the more it limits the choices and thus reduces the world of possibilities. In the political realm one can easily cause people to see individuals as members of a specific group by painting a vivid picture.
- The most** **Tversky** and **Kahneman** cite a related heuristic, the simplest and most powerful heuristic,

powerful
heuristic,
Repetition,
the
availability
heuristic.

the *availability* heuristic, repetition, (as **Edward Bernay**, the moulder of public opinion, advised) Repetition works in advertising and politics and religion, as **Hitler** also advised in *Mein Kampf*. (In current US politics, repeated *claims* of voter fraud tend to make people believe that it occurs more often than it actually does). **Donald Trump** in 2021 said, "If you say it enough and keep saying it, they'll start to believe you."

1976
*The Selfish
Gene*

Biology, evolution: **Richard Dawkins's** (ref. 1973) book, *The Selfish Gene*, said, "We and all other animals are machines created by our genes. . . a predominant quality to be expected in a successful gene is ruthless selfishness." "All life evolves by the differential survival of replicating entities."

"A human society based strictly on the gene's law of universal ruthless selfishness would be a very nasty society. . . Let us try to teach generosity and altruism." "Our genes may instruct us to be selfish but other factors, learned or experienced, can free us from a genetic impulse."

His "selfish" theory was challenged by critics saying that a gene can't act alone, it must cooperate with other genes to build living organisms and so is not an independent unit capable of being selfish. **Dawkins** responded that he had anticipated this objection as he had stressed that a "good" gene was one that worked well with others.

Critics have said that phenomena like altruism can't be explained by a gene-centered theory. **Daniel Dennett**, a cognitive scientist, has defended **Dawkins's** gene-centered theory.

1976 Psychology: **Dawkins** also posited the concept of a *meme*, the behavioral equivalent to the biological *gene*. He said, "With two contradictory statements, the truth isn't necessarily in the middle. One could just be wrong. (**Aristotle's** second basic law of thought.) Both of course *could* be wrong)

Dawkins:
*The God
of the Old
Testament
was an
unpleasant
God*

Theology: Regarding the *Bible*, **Dawkins** said, "The God of the *Old Testament* is arguably the most unpleasant character in all fiction: jealous and proud of it; a petty, unjust, unforgiving control-freak; a vindictive, bloodthirsty ethnic cleanser; a misogynistic, homophobic, racist, infanticidal, genocidal, pestilential, megalomaniacal, sadomasochistic, capriciously malevolent bully."

And, "Do you really mean to tell me the only reason you try to be good is to gain God's approval and reward, or to avoid his disapproval and punishment? That's not morality, that's just sucking up, apple-polishing, looking over your shoulder at the great surveillance camera in the sky . . . The largest known modern earthquake destroyed T'ang Shan, east of Beijing, 240,000 dead, 500,000 injured. If there's a God, OK, he didn't prevent it."

*Free Will
Defense*

Defenses to the *Problem of Suffering* like the *Free Will defense*, do not *per se* seek to prove a God exists; they only seek to defeat *The Problem of Suffering* which is recognized as the most powerful argument against the monotheistic God. There are other similar God-defeating logical problems for a perfect God besides *The Problem of Suffering*. (see AD 414)

1977
*Plantinga's
Free Will
defense*

Plantinga: (ref 1974) **Plantinga's free will defense** responds specifically to **Mackie's** (1955) response to believers's claim that humans doing evil is inevitable. **Mackie** had argued about suffering and evil *in the abstract* rather than discussing a specific evil. In *Evil and Omnipotence*, he had said that a God, if one existed, being omnipotent, could have created any logically possible world, one of which could be a world where persons would always do good and not cause suffering.

1977

Mackie had reasoned "If God has made men such that in their free choices they sometimes prefer to do what is good and sometimes do evil, why could he not have made men such that they always freely choose the good? [or evil?]. In other words, If there is no logical impossibility in a man's choosing the good action on one or more times, there cannot be a logical impossibility for humans to always freely choose the good action."

Plantinga

Plantinga's 1977 *free will defense* asserted that **Mackie's** argument did not establish an *explicit* logical contradiction between God and the existence of evil. That is, **Mackie's** premises were not on their own contradictory, so needed more premises and that any contradiction (or non-contradiction) must originate from implicit unstated assumptions of **Mackie's** argument, which he furnished.

**Plantinga
thought up a
new
concept,
"transworld
depravity."**

First, **Plantinga** said that God, though omnipotent, could not be expected to be able to do literally *anything* (although creating the world seems beyond logic.) He said, God's omnipotence meant only the ability to do things *logically possible* (as **Aquinas** had said).

Secondly, to dispute **Mackie's** assertion that God could create humans who would always freely do good, **Plantinga** created a concept he called *transworld depravity* which held that God could not create beings with *free will* who would not do evil at least once in their life. (His new concept, if true, voids claims of God's omnipotence and is speculation in any case.)

**Plantinga
compared
apples**

As an atheist, **Mackie** didn't believe in miracles. He just took the claims of believers about a Biblical or Qur'anic God's purported powers at face value. **Plantinga** argued that the moral value of human *free will* even to do an evil is a greater good that *outweighs* the

and oranges.

evil/suffering that humans may do and transworld depravity makes some evil inevitable. We have previously asserted that *comparing free will with suffering* is a category error as they are different kinds of concepts measured by different criteria. So, saying *free will is greater than suffering* is as useful as saying apples are greater than oranges.

Plantinga used the legitimate argument that two propositions are consistent with each other if both are consistent with a third proposition. His third proposition, namely his concept of *transworld depravity*, (i.e., that any person will do at least one evil thing in his life). He asserted that this concept was consistent with the existence of evil *and* consistent with God's *omnipotence*.

He then declared victory. He convinced some philosophers, including for a time, **Rowe**.

But **Plantinga's** claimed victory did not last. **Andrea Weisberger** (1995) and **Raymond Bradley** (2007) showed two ways how he incorrectly used the consistent-with-a-third-entity principle. (See 1995 and 2007) Further, in 2014, **Sean Meslar** showed **Plantinga's** transworld depravity idea was internally inconsistent. **Hume** had also refuted the *Free Will defense* in 1751. In 1999, **Gideon Rosen** posited iteration of *The Problem of Suffering* which has not been challenged, much less refuted. See 1999.

Plantinga didn't give any actual reasons justifying God

The Problem of Suffering is one of several equally probative contradictions among and between God's claimed attributes and the natural world discussed at AD 413-414.

The most telling shortcoming of **Plantinga's** approach is that he was apparently unable to think of a theodicy, namely, actual reasons why an omnipotent omniscient benevolent God exists. .

He could only propose a "defense" to the *Problem of Suffering* as expressed by **Mackie**. **Plantinga's** "defence" is no more than proposing a *possible*, not even *probable*, circumstance where the evil and suffering in the world is consistent with an omnipotent, omniscient benevolent God. His circumstance was soon shown faulty by **Weisberger** and by **Bradley**

Plantinga's arguments void the benevolence of his God and also ignore the argument of **Luke Maring** in 2014 that God has an *affirmative duty* to prevent suffering of innocents.

Plantinga conceded that some of the creatures God created with *free will* "went wrong" in the exercise of their freedom.

"Went wrong" misleadingly understates the horrendous sufferings millions of evildoers have caused.

For believers, Adam and Eve went so wrong that they brought sin into every human who ever was to live including babies, no matter where they lived or whether they ever were conscious of their sinfulness or whether they lived a pious life. **Plantinga** said that the fact that free creatures sometimes sin, however, didn't detract from God's omnipotence nor against His goodness for He could have forestalled the occurrence of moral evil only by removing the possibility of moral good. This defies logic.

The *Stanford Encyclopedia of Philosophy* suggests that **Plantinga** picked an easier target (evil in the abstract) than had he chosen a specific evil, such as animals caught in a forest fire.

Natural Evils

He argued that "non-human persons," the *free will* of spirits, angels, or devils, cause natural evils. He said it's not irrational to believe that demons push the geologic plates that actually make earthquakes. This defeats the claim that his God is monotheistic God. **Plantinga's** "mighty non-human spirit" would need the same proof as a God, so he's back to square one.

Needless to say, this argument that some mighty non-human spirit causes natural evils and sufferings (like earthquakes) was largely dismissed. Other theologians also disputed his claim of victory. Regarding the evolution of humans, **Plantinga** said it's plausible that God could have caused the genetic changes that evolved humans from other primates (and all evolution as well.)

Plantinga also posited the concept of "*properly basic beliefs* that we accept but not on the basis any other beliefs." "Without such beliefs it would be impossible to believe anything at all." "Belief in God is such a belief for those who have a sense of His reality and presence which is as strong as, or perhaps even stronger, than their belief in their own existence or that of the external world." In 1978, **Plantinga** co-founded the *Society of Christian Philosophers* and became its third president 1983-86.

1978 The West historically considered the East inferior

Political Theory, Western attitudes about Eastern societies: *Orientalism* by **Edward Said** (1935-2003), in which he established the term "Orientalism" as a critical concept to describe the Western world's commonly contemptuous depiction and portrayal of the Eastern world—that is, the Orient. Societies and peoples of the Orient are those who inhabit regions throughout Asia and North Africa.

Said argued that Orientalism, in the sense of the Western scholarship about the Eastern world, is inextricably tied to the imperialist societies that produced it, which makes much Orientalist work inherently political and servile to power regarding the West's superior opinion over the societies and cultures of "The East," stemming from its imperialist past. His model of textual analysis transformed the academic discourse of researchers in literary theory, literary criticism, and Middle Eastern studies

1978 Mormonism: A divine revelation told the Mormon president it was now okay for Blacks (but not women or homosexuals) to become Mormon priests. By coincidence, Africa was a fertile area to proselytize. The maximum penalty for errant Mormons is excommunication, not the stake.

How we think

Economics, Psychology, Prospect theory: Psychologists **Kahneman** and **Tversky** (ref. 1973, '75) critiqued *Utility Theorem* (1944). They posited *Prospect Theory* which said persons *dislike* losing a definite amount of money more than they *liked* gaining it, so they are risk-adverse, not neutral. They said that persons decide based on the potential value of gains or losses rather than the final outcome. Their *Prospect theory* even predicted common deviations from expected results from *Utility Theory*.

Prospect theory has given new insights into decision making.

They distinguished between fast and slow thinking. Fast is automatic, subconscious, and self serving. Slow is reasoned, deliberate, probably more accurate. (More p. 399)

1979 Theology, Cosmological Argument: **William L Craig**, a fundamentalist Christian theologian, published *The Kalam Cosmological Argument*, which revived an argument which traced first to **Aristotle's** "prime mover", then to **Philoponus** (ref 549) and then to Islamic scholasticism, *kalam*, and philosopher **Al-Ghazali** (ref. 1085). The argument essentially says 1. "Whatever begins to exist has a cause for its existence. 2. The universe began to exist. 3. Conclusion. The universe had a cause for its existence, (which had to be a powerful, intelligent uncaused Creator). He has defended this argument in debates since 1979. (more **Craig** 2012)

Problem of Suffering

In response to the claimed success of **Plantinga's free will defense**, **William Rowe** (1931-2015), American, professor of philosophy, proposed a different *Problem of Suffering* that was *inductive* rather than *deductive*. The *Problem of Suffering* thus evolved into two branches; the traditional *logical Problem of Suffering / Evil*, and **Rowe's Evidential or Probabilistic Problem of Suffering**, which asserts that even if it can be shown that there is a *possibility* that under some circumstances that there is no logical incompatibility between a God and the existence of evil / suffering, that it is still extremely unlikely that a perfect God exists.

Problem of Suffering

Rowe stated "the *Evidential or probabilistic Problem of Evil / Suffering* where natural evils and sufferings are seen as needless in the world and are thus evidence against the *probability* of a perfect God, not its logical *impossibility* as the *logical Problem of Suffering / Evil*, and other *Omnipotence paradoxes* show. The *Evidential Problem of Evil/Suffering* has two premises and a conclusion, namely:

1. "There are cases of intense suffering which an omnipotent omniscient being could have prevented without losing some greater good or allowing some evil especially bad or worse." (the factual premise, a fact about the world. It seems reasonable that there are many such instances as described in premise 1)

2. "An omniscient, omnipotent, wholly-good being would prevent the occurrence of any intense suffering it could, unless it could not do so without thereby losing some greater good or permitting some evil [suffering] equally bad or worse." (This the theological premise, how a wholly good God would act.)

3. Conclusion: "Therefore, there does not exist an omnipotent omniscient wholly good being. As there are rational grounds to accept the premises, there are rational grounds to accept the conclusion."

Open Theism

A new defense to counter **Rowe's Problem of Suffering** called *Open Theism* disputed **Rowe's** premise 2 by saying God's omniscience doesn't include foreknowledge. But, the Biblical God is all-knowing **and** omniscient without limit. This refutes *Open Theism*.

1980 Behavioral Economics: **Richard Taylor**, American psychologist, based on work of **Daniel Kahneman** and **Amos Tversky** (ref 1973, '75) published, *Toward a Positive Theory of Consumer Choice*. **Daniel Kahneman** called it the founding text in behavioral economics. (More, p.399)

A history of the working class

Epistemology, History: World histories normally relate the actions of the ruling class, who **control society**. The study of American history was upended by the publication of **Howard Zinn's A People's History of the United States**. He mined and quoted from a huge body of little known literature of the underclasses. He wrote the history of the US from the point of view of the workers and poor people. He described the struggles and hardships and rebellions and injustices endured by Blacks, Indians, women, indentured servants, frontier people, textile workers, small farmers, children workers. **Zinn** presented a different side of history from the more traditional "fundamental nationalist glorification of country". (This book, for example, relates what the tiny slice of most knowledgeable people knew) He portrayed a side of American history different from the point of view of the upper classes..

The book "resulted in a fundamental change in the focus of [American] historical work, which now includes stories that previously were ignored." **Zinn**, a socialist, said, "My hero is not **Theodore Roosevelt**, who loved war and congratulated a general after a massacre of Filipino villagers."

1980 Astronomy, Cosmology: **Alan Guth** (1947-), American cosmologist, physicist, and **Alexei Starobinsky** (1948-), a Russian-American astrophysicist and cosmologist, proposed that a negative pressure field, similar in concept to what is now called dark energy, could have caused the cosmos to explode in the very early universe. Such phenomenon was a repulsive force, qualitatively similar to dark energy, that resulted in an enormous and exponential expansion of the universe slightly after the *Big Bang*. (See 1998)

1980 **The universe** Astronomy: **Carl Sagan** (1934-96) (ref. 1968, '73), American astronomer, atheist, His book *Cosmos*, said, "We have examined the universe in space and seen that we live on a mote dust circling a humdrum star in the remotest corner of an obscure galaxy. and if we are a speck in the immensity of space, we also occupy an instant of time in the expanse of ages."

Our *Milky Way* galaxy contains 200-400 billion stars and there are perhaps 100 to 500 billion galaxies, many larger than our *Milky Way Galaxy*. Estimates vary. Light from the *Andromeda Galaxy*, (with an estimated trillion stars) the closest galaxy to our *Milky Way* left that galaxy c2.5 million years ago.

The universe Astronomy: The *Andromeda Galaxy* approaches the *Milky Way* at speeds estimated at from 62 to 87 mps. 99% of the known universe is hydrogen and helium (74% hydrogen, 25% helium, the other naturally occurring elements comprise under 1%). 99% of known *living organisms* in the universe are made up of just four elements, hydrogen, carbon, nitrogen, and oxygen. The *Abell 2029 Galaxy* is 60 times the size of our *Milky Way Galaxy*, and has c.100 trillion stars. Some galaxies are billions of light years away.

Planets' Orbits times around our Solar system Orbits times: The further from the Sun, the longer the orbit. Mercury, the closest 88 days, Venus 224.7 days, Earth 1 year or 365.2422 days, Mars 1.88 years, Jupiter 11.86 years. Saturn 29.46 years, Uranus 84 years. Neptune 165 years, Pluto (now a dwarf planet as it's .002 the size of Earth) and the farthest from our Sun 248 years. These planets orbit in a plane within 3 degrees from Earth's orbit. .

Full Astronomy Timeline, pp. 432-437 Our Sun, compared to other stars in the universe, is not particularly large, but is 1.3 million times larger than the Earth and comprises 99.866% of the known mass of our small Sun's solar system. To scale, if our Sun were one yard in diameter, the Earth would be the size of a pea and Pluto would be a 1.5 miles away, 50 times smaller than a BB pellet. "Empty" space is not empty. According to American cosmologist, **Lawrence Krauss** (2012) it is teeming with magnetism and energy.

Our Sun is c27,000 light years from the "center" of our *Milky Way* galaxy. One light year is c5.88T miles. The distance of the Earth to our Sun of c.93 million miles is known as an Astronomical Unit (AU).

The star/sun *Antares* in our *Milky Way* galaxy has itself a *diameter* of 363 million miles, more than two times times larger than the diameter of the Earth's *orbit* around the Sun. The closest star to our star/Sun, *Alpha Centauri*, in our *Milky Way*, is 26T miles away, 4.5 light years. Black holes are found throughout our *Milky Way* galaxy and have masses much larger than our Sun. (See 2024 in the *Astronomy Timeline*)

A teaspoon of a gas contains more than ten million trillion molecules. But a teaspoon of water contains 2,000 times as many. In other words, any container of a gas is mostly empty compared to an equivalent container of a solid substance. The molecules of gas constantly move, colliding and bouncing off each other, (600 million times per second, faster when their temperature rises. These numbers were not known until the 20th century) (1cc of any gas, at zero Celsius (water freezing) and at atmospheric pressure, contains 2.68986×10^{19} atoms or molecules, This is **Avogadro's Constant**). If the *Celsius* temperature rises one degree, the volume or the pressure of a gas rises 1/273 (.366%).

Carl Sagan Quotes Sagan: "The fact that some geniuses were laughed at does not infer that all who are laughed at are geniuses. They laughed at **Columbus**, **Fulton**, and the **Wright** brothers. But they also laughed at Bozo the Clown." "Avoidable human misery is more often caused not so much by stupidity as by ignorance, particularly our ignorance about ourselves."

Sagan Quotes "How rigorous the standards of evidence must be if we are really to know something is true, how many false starts and dead ends have plagued human thinking, how our biases can color our interpretation of evidence, and how often belief systems widely held and supported by the political, religious and academic hierarchies turn out to be not just slightly in error, but grotesquely wrong."

A contrary fact defeats a theory. Facts rule. "Microbiology and meteorology now explain what only a few centuries ago was considered sufficient enough to burn women to death." "There are many hypotheses in physics of almost comparable brilliance and elegance that have been rejected because they did not survive a confrontation with experiment." **T H Huxley** said, "The great tragedy of science: the slaying of a beautiful hypothesis by an ugly fact"

Sagan quotes "Who is more humble, the scientist who looks at the universe with an open mind and accepts whatever the universe has to teach him, or somebody who says everything in [the *Bible*] must be considered the literal truth and never mind the fallibility of all the human beings who actually wrote it?"

- 1981 Power of religion: 112 years after **Darwin**, Louisiana legislators required schools to teach creationism as an alternate theory to evolution. (See 1987, law was unconstitutional. **Scalia** and **Renquist** dissented.)
- 1981 Theology: **Anscombe** (ref 1948) said **C S Lewis's** 1960 revised arguments were more serious and "much less slick" but there was still much to criticize in his 1960 revision, namely that **Lewis** had failed to define certain key notions and to discuss those notions as well as he should. (next **Anscombe** 1985) .
- 1982 **Dark matter doesn't exist** Astronomy, dark matter: **Morcardi Milgrom**, Israeli, proposed an alternative to the current theory of dark matter. He proposed that using a higher value for gravity would eliminate the need for the then (and still) *inferred* and *unknown* and *not-understood* "dark matter."
Milgrom argued that dark matter couldn't be identified as it didn't exist. His theory is based on **Einstein's** theory of GR that agrees with **Newton's** gravity where gravity is relativity strong but predicts gravity acts differently in extreme environments such as near black holes.
- MOND** **Milgrom** said gravity similarly varies from Newtonian where Newtonian gravity is 100 billion times weaker than on Earth. **Milgrom's** theory is called MOND, *Modified Newtonian Dynamics*.
 But, no single modification of gravity can explain all the phenomena that dark matter can. MOND has made some impressive accurate predictions, and even though astronomers do not know what, if anything, dark matter is made of, it is still the majority view. The jury is still out. So, scientists haven't yet figured out what most of the cosmos is, if anything. (See 1998-Dark energy)
- 1983 **Universe has no boundaries** Physics, Cosmology: **Stephen Hawking** (ref. 1669, 1974) theoretical cosmologist, and **James Hartle**: "The universe has no known physical boundaries." **Hawking** and other cosmologists said that there is a law of nature called the *Wave Function* of the universe that inferred that there is a 95% probability that our universe came into existence without a cause.
- Steven Hawking Quotes**
Thus, no possibility of a creator.
 The *Big Bang* model was modified to include an incredibly huge expansion in the first micro second of the *Big Bang*, *inflationary cosmology*. **Hawking**: "The role played by time at the beginning of the universe is, I believe, the final key to removing the need for a Grand Designer, and revealing how the universe created itself. Time itself must come to a stop. You can't get to a time before the big bang, because there was no time before the big bang. We have finally found something that does not have a cause because there was no time for a cause to exist in."
 "For me this means there is no possibility of a creator because there is no time for a creator to have existed." He said the search for a logical self-consistency theory always comes first, which makes further predictions. If a theory is proven wrong, it is discarded.
 In the 1970s, physicists said that at least 60 different kinds of subatomic particles exist. Some are elementary particles, some are combinations of such elementary particles. These combine in various ways to make up protons and neutrons. Electrons are themselves elementary particles
- 1983 **Nature never fails** Philosophy: **Buckminster Fuller**, philosopher, scientist, developer of the geodesic dome. Nature never "fails." Nature obeys its own laws. Nature is the law. When people lack understanding of Nature's laws-contrived structure fails unexpectedly, it does not fail. It only demonstrates that they did not understand Nature's laws and behaviors. Nothing failed. Man's knowledge or estimating was inadequate."
- The will to matter** Philosophy: **Rebecca Newberger Goldstein's** book, *The Mind Body Problem*, furthered the "*Mattering Theory*" as her main character believed that the "*will to matter*" was a fundamental human motivation.
- 1983 Philosophy: **Peter van Inwagen** (1942-), philosopher, His *An Essay on Free Will* introduced the term "incompatibilism" to contrast with "compatibilism" (the view that *free will* is compatible with determinism).
- 1984 **Ignore reason, have faith** Christianity: **Robert Reymond** (1932-2013) a Christian theologian of the Protestant Reformed tradition and the author of *New Systematic Theology of the Christian Faith*. His *Justification of Knowledge* said that, "believers should not try to prove God exists by argument as such arguments are fundamentally unsound. They should accept the content of revelation by faith." (**John Paul 2** did just that in 1988.)
- 1984 Cosmology: **Quentin Smith** (1952-2020), professor of philosophy, prolific author, said that quantum mechanics says that the universe could have begun without a cause. Other cosmologists agree. **Smith** also argued in 1987 that the *Kalam Argument* does not preclude the possibility of an infinite past.
- 1985 Theology: **Anscombe** (ref 1948) said **C S Lewis's** 1960 revised arguments were more serious and "much less slick" but there was still much to criticize in **Lewis's** revision, specifically that he had failed to define certain key notions and to discuss those notions as well as he should.
- 1985 **CS Lewis and the Search for** Theology: **John Beversluis** (1934-2021) wrote **C S Lewis and the Search for Rational Religion** to refute **Lewis's** 1947 book *Miracles, a Preliminary Study* and **Lewis's** 1960 revision. **Beversluis** first critiqued **Lewis's** *Argument from Desire*, which was that humans have an innate desire for joy beyond the natural

Rational Religion

world and God fulfills that need. **Beverstluis** said that there was no evidence that such desire was a cultural universal, that many people were perfectly happy with their lives without such desire. He asked if there is an object corresponding to the desire for joy, it ought to be able to be described, but it hasn't been.

Lewis' *'Moral Argument'* is basically that all people have a notion of right and wrong, and the only explanation for this sense of morality must come from a Power behind this moral law, known as God.

Beverstluis said this argument was simply speculation, that it is based on some questionable assumptions related to **Plato's Euthyphro dilemma**, and it also depends on **Lewis'** criticisms of 'ethical subjectivism', against which theory **Lewis** only critiques straw man arguments rather than the strong arguments of **Hume** and **Hobbes**. **Beverstluis** disputed **Lewis's Argument from Reason** (a phrase he coined) which stated that naturalism was incompatible with reason. He said that this also was speculation. He agreed with **Keith Parson's** refutation stating that if **Lewis** meant that if naturalism were true, then there was no such thing as valid reasoning

- 1985 **Beverstluis** answered **Lewis's "Jesus' trilemma"** (**Jesus** was either Lord, lunatic, or liar). He described **Lewis's** arguments as "textually careless and theologically unreliable" and the trilemma argument as logically unsound and an example of a false dilemma. Specifically,
1. that due to the unreliability of the *Bible*, there was no certainty as to what **Jesus** actually did claim.
2. **Lewis** did not mention other reasonable alternatives such as that **Jesus** was simply mistaken.
(**Bart Ehrman** added a fourth "L", "legend"; that the human authors of the *New Testament* (written long after **Jesus** died) had said **Jesus** was divine simply to enhance their sect's attractiveness and authority.)

How we think

1986 **Dan Sperber** and **Deidre Wilson** introduced *Relevance Theory*. Namely, human thinking is geared to maximizing the relevance to what humans read or hear. One's words aren't an encoding of one's meaning. They are evidence from which one's meaning is inferred.

The religion industry

1986 **Economics: Anton Szandor LaVey**, wrote the *Satanic Bible*. He said being head of the First Church of Satan, "It's a living." This sounds flip, but for hundreds of thousands, it's the simple truth. The *Interdisciplinary Journal of Research on Religion* said that the "religion industry" contributed \$1.2 trillion to the US economy yearly.

Theodicies are tepid, shallow, & frivolous

Theology, Problem of Suffering: Plantinga (ref. 1977) posited an improved "defense" to *The Problem of Suffering* (again not a theodicy, *actual reasons for a God*). He said, "We cannot see why our world, with all its ills, would be better than others we think we can imagine, or what, in any detail, is God's reason for permitting a given specific and appalling evil. Not only can we not see this, we can't think of any very good possibilities. Most attempts to explain why God permits evil- theodicies, as we may call them- strike me as tepid, shallow and ultimately frivolous." *Inter alia*, this argument *assumes* a God.

Creationism

US Supreme Court: The 1981 Louisiana law *requiring* teaching *Creationism* as *science* in public schools was declared unconstitutional (as it promoted a religion). Justices **Scalia** and **Rehnquist** dissented.

In response to this decision, in 1989, creationists devised the concept of *Intelligent Design* ("ID"), identical to the theistic *Design Argument* but without *explicitly* saying the designer was God.

Creationists used a word processor to replace the word "God" with "*intelligent designer*" in some *Design Argument* writings. They then urged schools to teach *ID* as an alternate theory of evolution or merely to "teach the controversy," (which they had created). (**George W Bush** supported teaching *creationism* along with evolution in public schools. As president, he supported creationism. See 2005).

Originalism, a controversial legal theory

1987 Law, *Originalism*: is a theory of statutory interpretation strongly promoted by conservative legal scholar **Robert Bork** that asserts that provisions of the *Constitution*, should be interpreted to reflect what the framers intended and that their meaning can not be changed by judges. In 1985, President **Reagan's** Attorney General emphasized originalism. **Reagan** nominated **Bork** for the Supreme Court. *Originalism* became important and well known.

Originalism disfavors the poor

Originalists have used the *Constitution* like some use the *Bible*, to be used when it suits their purpose, ignored when it doesn't. Originalists say that *originalism* was historically the primary method of legal interpretation until the 1930s, when theories of interpretation less faithful to original meaning became more popular. *Originalists* have used the specific words of the *Constitution* in situations where the context of the provision is inconsistent of their basic spirit. Justice **William Brennan** called it "arrogance cloaked as humility."

Finding the intent of the framers is not simple. Being faithful to the law is of course an admirable principle, No one can argue with it in principle, but like many things, the devil is in the details.

Only two founders kept detailed written records of their thoughts, **Madison & Hamilton**, & their views were not the same. Laws today normally have detailed histories. Not in 1788. We also know that the provisions of the *Constitution* were mostly compromises among men like the Federalists and the anti-Federalists with starkly different views. Most of the writers of the *Constitution* most likely

Legal theory Intent

Originalism considered Blacks and Native Americans to be inferior races and that women, indentured servants, and men without property should have lesser rights than propertied White males. (We know this as that's how they wrote the *Constitution*)

Originalism has not had an admirable history. Its most prominent first example was the ugly 1857 decision in the *Dred Scott* case where Chief Justice **Roger Taney** said, "the framers of the *Constitution* did not regard negroes as being among the people for whose benefit and protection the US government was founded." It was also used in 1896 in **Plessy v. Ferguson** to approve racial discrimination in railroads. In the 1960s originalism was used to help stymie civil rights legislation. In the 1980s, it was used to oppose social legislation. In deciding cases regarding gun ownership, right wing judges, claiming to be originalists, had to rewrite and distort facts to use originalism to decide for gun owners. They rewrote the *Constitution* by simply deleting the first clause of the *Second Amendment*, the clause that explains why individuals were allowed to own guns.

Legal Theory *Originalism* itself has come to have different schools which can lead to different results. As

Intent *Constitution* provisions were mostly compromises among different views, it is sometimes difficult to say that there was a specific "intent" of the Constitutional provision involved. Certainly *some* of the deputies, like slave owners, did not wish to "protect" *anything* for Negro slaves, but just as certainly, *some* deputies did. There was no one "intent." Many Constitutional provisions (like laws today) were compromises among the deputies with different views. The best known example of a compromise was when criticism of slavery was deleted in the drafting process solely to get the Alabama and Carolina deputies to sign the *Constitution*. Similarly, the average colonial man or woman had no political influence and most probably would have wanted a *bill of rights* if they were even aware of the fact that the deputies considered and rejected the *Bill of Rights* proposed by **George Mason**.

**Brennan:
Originalism
is arrogance
cloaked
as humility**

Supreme Court Justice **William J. Brennan Jr.** described originalism as "arrogance cloaked as humility" during a 1985 speech. He also stated "It is arrogant to pretend that from our vantage we can gauge accurately the intent of the framers", and that politicians that claim to do so are motivated purely by political reasons, as they "have no familiarity with the historical record."

Harvard Law School scholar **Richard H. Fallon Jr.** Has argued often that the Supreme Court Justices who claim to be Originalists actually apply Originalism in a highly selective manner "which typically abets substantively conservative decision making."

**"Textual"
Originalism
can give a
different
result**

A second *Originalist* school, *textualism*, says that the text *alone* is the best theory of interpretation. Justice **Antonin Scalia** favored this interpretation. He said, "[It] is the precise words of the law that governs, not the intent of the lawgiver." Scalia wanted to call it the "doctrine of original meaning." The issue then becomes an examination of the particular words with linguistic experts opining on what the "words" meant in 1789. **Scalia** cited two 1770s dictionaries in one case. This school of interpretation is easily inconsistent with the "intent" school

**Original
Meaning
Originalism**

A third school, the *original meaning* school, closely related to *textualism*, is the view that interpretation should be based on what the average Colonial person living at the time of its adoption would have understood the ordinary meaning of the text to be. This also sounds reasonable, but on examination, is faulty. The *average* ordinary Colonial man or woman was poor, uneducated, possibly illiterate, and propertyless and did not participate in any way with determining the text of the *Constitution*.

**Originalism
and funda-
mentalism**

Some legal scholars have criticized *Originalism*. **Cass Sunstein**, a well known law professor, calls *originalists* "fundamentalists". *Originalism* has much in common with Christian fundamentalism. They both assert that their sacred texts have a readily ascertainable fixed meaning. They both feel that their sacred texts have been misinterpreted by persons with inferior cultural values. Both have separate sub-schools.

**Originalism
is a great
hustle**

Adam Serwer of the *American Prospect*, wrote similarly, "to the *originalists*, [the *Constitution's* directives] are "always perfectly clear: The answer is whatever they want it to be, all other conclusions are inherently illegitimate. That's what makes *originalism* such a great hustle — its arbitrariness is masked by a bulletproof rhetorical argument - that its adherents are simply "applying the law as written." Like **Cass Sustein**, he says, "In a way, *originalists* are like religious fundamentalists who insist on following their religious texts literally but in practice only select those that fit their prevailing cultural sympathies, dismissing others as heretics and unbelievers."

The varied theories of interpretation have led to manipulation. No legal scholar is misled by judges who claim fealty to the *Constitution* using "*originalism*," its devotion to upper class priorities, and its selective use. **David Souter**, a former Supreme Court justice, in 2010 said *originalism* was "misguided."

a scam

Saul Cornell, a law scholar at Yale called it a "Constitutional scam," as "its methodology is murky, its practices dubious," and it is "bad history shaped to fit an ideological agenda." The founders had widely divergent views. It is "little more than an intellectual shell game in which contemporary political preferences are shuffled around and made to appear part of the *Constitution's* original meaning."

Judges use originalism selectively to advance a right wing agenda. Gun laws in the colonies

In 2021, **Cornell** wrote, "The [SC] court appears to be perfectly happy to trot out originalist rhetoric when it serves its interests and abandon it entirely when the historical record does not serve its political goals." The regulation of guns throughout colonial America included 1. criminalizing the transfer of guns to Catholics, slaves, indentured servants, and Native Americans; 2. regulating the storage of gun powder in homes; 3. in Boston, banning loaded guns in houses. The colonies had laws regulating 4. who if anyone may own a gun, 5. where a gun may be used, and even 6. required loyalty oaths from gun owners. The Supreme Court has ignored this "originalist" history to favor gun owners. Gun owners were powerful.

Eric Segall, a constitutional law professor, criticized *originalism* in his book, *Originalism as Faith*, for "both the hypocrisy of self-styled originalist Supreme Court judges, and the ubiquity of the Court's non-originalist constitutional law doctrines."

Originalism can nullify peoples rights

Erwin Chemerinsky, law dean at Berkeley, in 2018 wrote, "Never in American history, thankfully, have a majority of the justices accepted *originalism*. If they did, there would be a radical change in constitutional law. No longer would the *Bill of Rights* apply to state and local governments.

No longer would there be protection of rights not mentioned in the text of the *Constitution*, such as the right to travel, freedom of association, and the right to privacy. It would mean the end of constitutional protection for liberties such as the right to marry, . . .to procreate, . . .to custody of one's children, . . . to keep a family together, or to purchase contraceptives, or the right to abortion.

No longer would women be protected from discrimination under equal protection." He wrote, "Conservative judges will, in any event, ignore original meanings when it suits their purposes, as with *Shelby County vs. Holder* in 2013, which, on a 5-4 vote, struck down key provisions of the *Voting Rights Act* as violating the "principle" that Congress must treat all states alike even though there is no such principle anywhere in the *Constitution*, or any subsequent case."

1987 The US is far different from 1789

Brett Parker, a legal scholar at Stanford, called *Originalism* "a racist and intellectually dishonest fringe theory ill suited for today's society." **Jill Filipovic**, a legal scholar, summed up current legal opinion on *originalism*, It's "a farce, . . . a rational-sounding cover for a more insidious set of right-wing beliefs, a way to allow rampant discrimination against actual people while protecting the interests of corporate "persons." *Originalism* is basically an ideological position with legal trappings. Its adherents claim to be conservatives. The world and the US have changed a great deal in spirit since when it was run exclusively by rich white propertied males. **Garrett Epps**: law professor, If *Originalism* were no more than an academic fad, we need not concern ourselves overmuch with it. But "conservative" judges use it as a well-developed set of rhetorical tropes to justify their decisions, particularly those that overturn established precedent or further anti-democratic goals.

No matter which "school" of interpretation is used, *Originalism* always favors the powerful at the expense of the powerless. In searching for a provision's meaning, originalists ignore the *Preamble to the Constitution*, "We the People of the United States, in order to form a more perfect Union, establish Justice, ensure domestic Tranquility, provide for the general Welfare, and to secure the Blessings of Liberty to ourselves and our Posterity, do ordain and establish this *Constitution for the United States of America*." *Originalists* must assert that they did not want judges in the future to reflect changing circumstances. The more common practice of judges until 2020 was to recognize the world has changed and to consider the purpose of a law and its legislative history to help them understand it.

In 2020, "originalists" became a majority of justices on the Court.

1987 **Philosophy: Allan Bloom's** *Closing of the American Mind* said, "Greece should be the main aim of education as it provided the models for modern achievement; the big issues it raised have not changed." His book became useful for those on the right to ridicule those on the left for being "politically correct."

1988 **Paleontology: Gerta Keller:** The 444-66M BC extinctions were due to ash from volcanoes in W. India.

A Brief History of Time

1988 **Cosmology: Hawking:** (ref 1974, '83) *A Brief History of Time*, "Even if there is only one possible unified theory, it is just a set of rules and equations. What breathes fire into the equations and makes a universe for us to describe? The usual approach of science of constructing a mathematical model cannot answer why there should be a universe for the model to describe. Why should it exist?"

There is order in nature

Hawking wrote, "The whole history of science has been the gradual realization that events do not happen in an arbitrary manner, but they reflect a certain underlying order." [If a God set the natural laws] "he has since left the universe to evolve according to [the natural laws] and does not now intervene in it."

Relativity and quantum mechanics allow matter to be created out of energy in the form of particle/ antiparticle pairs. The energy to create such matter was borrowed from the gravitational energy of the universe. Other cosmologists proposed *quantum gravity* to reconcile relativity and quantum mechanics. No proof yet.

Analyzing In *A Brief History of Time*, **Hawking** wrote, "Philosophers reduced the scope of their inquiries so much

language is the sole task left for philosophers

that **Wittgenstein**, the most famous philosopher of this century, said, "The sole remaining task for philosophy is the analysis of language." This was seen as a comedown from the great philosophies from **Aristotle to Kant**. **Hawking** said, "if we do discover a complete theory, it should in time be understandable in broad principle by everyone, not just a few scientists."

1988 "Then we shall all, philosophers, scientists, and just ordinary people, be able to take part in the discussion of the question of how it is that we and the universe exist. If we find the answer to that, it would be the ultimate triumph of human reason – for then we would know the mind of God."
Hawking later phrased this thought as, "a scientist's "theory of everything".

John Paul 2 called science and Christianity complementary

Catholicism: Over the centuries, the most prominent Christian theologians and philosophers, **Irenaeus, Augustine, Anselm, Gregory the Great, Aquinas, Descartes, Martin Luther, Leibniz, Pascal, Francis, Ignatius, John Bunyan, Thomas More, Kant, Goethe, C S Lewis, Billy Graham, John Hick, John Duns Scotus**, and others, had all devised purportedly rational arguments for their Christian God. The Church had in turn waged an all-out war on new advances of science.

In the 20th Century, science was the dominant intellectual force. Pope **John Paul 2/Karol Joseph Wojtyla**, Polish (1920-2005), the first non-Italian pope for centuries, understood the power of reason.

John Paul 2 abandoned all previous rational arguments for God.

John Paul 2 *abandoned* all previous purportedly rational arguments for God. He released a letter announcing a new Christian position. He wanted to keep Christianity relevant in the face of the force of scientific / rational thought. So, with mountains of explanations how science and religion were really good friends, equal in dedication to humanity, and saying science was built on faith; that science and faith were in different worlds; that "Science can purify religion from error and superstition; and religion can purify science from idolatry and false absolutes."

"Christianity possesses the source of its justification within itself and does not expect science to constitute its primary apologetic."

He then got to the guts of his letter. He wrote, "Christianity possesses the source of its justification within itself and does not expect science to constitute its primary apologetic." **John Paul** thus admitted the obvious, His statement acknowledged that scientific /rational arguments for God had not worked. They had in fact been refuted logically. Recall, **Protestant Reymond** said this in 1984. What was noteworthy was that the Church admitted the obvious at all. It had long been living in its own world seemingly oblivious to the outside world (like Pope **Pius 10** forbidding seminarians from reading newspapers. See 1907). It's clear that if scientists *had* actually found proof of God, Christian theologians would have embraced it fervently.) Like the Hebrew God and the Sumerian god **Marduk**, **John Paul** didn't even try to answer why innocents suffer under a powerful good God. He just said the question didn't need answering Ten years later **John Paul** caused the church to apologize for numerous of its previous cruel actions. (See 1998)

1989 Economics, Slavery: **Evsey Domar** (1915-97) professor at MIT, argued that the more or less simultaneous rise of serfdom in Russia and slavery in the New World were driven by the opening of new land, which made labor scarce and would have led to rising wages even without coercion.

Philosophy: **Roger Penrose** (1931-), Brit, polymath. In *The Emperor's New Mind*, argued that known laws of physics were inadequate to explain the phenomenon of consciousness. He got the Physics Nobel for predicting there are regions in space where gravity is so intense that space-time would break down.

1989 **Internet** The Internet is born: **Tim Berners-Lee** (1955-), Brit, a researcher at CERN, created an easy way for one computer to reach another computer – the concept of the URL, or Uniform Resource Locator.

1989 Very touchy religion: **Ayatollah Khomeini**, spiritual leader of Iran, issued a *fatwa*, an order to kill **Salmon Rushdie**, who had written an anecdote in *The Satanic Verses*, which Muslims said mocked their religion.

1989-91 **USSR collapses** The prosperity of Western European countries compared to Soviet bloc economies caused the Soviet Union to collapse. Countries under Russian control became independent, choosing at least nominally, capitalism. The largest communist country, China, retained Communist party rule, but industrialized like the West.

Theistic Response to The Problem of Evil

No "Greater Good"

1991 Theodicy: Anglican **Richard Swinburne** (ref. AD 161) had said, "*The Problem of Evil* has always been the most powerful objection to traditional theism." But, **Swinburne** had his answer to the Problem.

His 1991 "*Theistic Response to The Problem of Evil*," said, "A good God would have reason to create a world in which there were men of . . . responsibility for each other, despite the evils which would inevitably or almost inevitably be presented in it."

His answer to the *Problem* like all the early answers, started with an *assumed* God and then tried to justify suffering. He also said that as God gave humans the great gift of free will, "It is not *logically possible* that God could give us such free will and yet ensure that we always use it in the right way. "

A good God would certainly have intervened a long time ago to stop some of the things that happen in our world. Here I believe is the crux-It is simply a matter of quantity."

These are unusual admissions for a defender of God's existence. He sensibly said,

It does not make sense to assume there are greater goods that justify evils or sufferings unless we know what the greater goods are. Until then, one cannot have a successful theodicy.”

Swinburne also said, that the Holocaust gave Jews a wonderful opportunity to be courageous and noble. After a furor, he explained that he didn't mean to justify Nazis, just to justify God's non-intervention, a weak distinction “ He said, “**Aquinas's Proofs for God** (1279) were weak individually but strong when considered together.” (**Thomas Carlyle** in 1841 had said, “I do not believe in the collective wisdom of individual ignorance.”)

1991 **Atheism:** **Madalyn Murray O'Hair**, “the difference between an atheist and an agnostic,. . . guts.”

1991 **Mackie's** (ref. 1955) book, *Ethics, Inventing Right and Wrong*, opens with, “There are no objective values.” Ethical principles are invented, not discovered.” Ethical principles vary from culture to culture.

1991 **Geology:** A 111 mile wide asteroid crater was found north of the Yucatan. It was dated it to c66M BC. It caused a huge tsunami that killed many species and may have caused the extinction of dinosaurs. Physicist **Luis Alvarez** and son **Walter Alvarez** accepted that theory.

This differed from the **Keller** 1988-volcanic ash theory). This dispute is unresolved.

Both sides search for new evidence. (*Atlantic magazine*, 9-2018)

c.1991 **Political Theory, medieval ignorance:** U S President **George H W Bush** (1924-2018), said, “I don't know that atheists should be considered as citizens, nor should they be considered patriots.”

1991 **Skepticism:** **Mario Bunge** (1920 -2020), a Canadian physicist and philosopher, explained the difference between a scientist's *methodical skepticism*, which judges new theories according to their logical consistency, their relation to previously verified principles, to experiment and observation and *systematic skepticism*, which denies the possibility of any knowledge so that truth is inaccessible.

1992 **Catholicism:** 450 years after **Copernicus**, and after a the Vatican “studied” it for 13 years, admitted it had wrongfully condemned **Galileo** in 1633. **John Paul 2** (ref. 1988) said that the cardinals who convicted **Galileo** erred in thinking that the *Bible* described geocentrism. In other words, that the *Bible* didn't really say the Sun orbited Earth. This is paltering. There are many biblical verses about the Sun setting or rising. *Joshua 10:14,12*, says, “The Sun stood still,” clearly implying it normally moved. So, the Vatican had denied what astronomers knew for 450 years .

The Vatican
had misled
people for
centuries.

CMB **Cosmology:** Tiny variations were found in the cosmic microwave background radiation (“CMB”), indicating places in the cosmos with enough matter over time to gravitationally attract other matter which then became galaxies and stars. CMB is thermal radiation assumed to be left over from the *Big Bang*. It is the oldest light in the universe. *Steady State* had no initial singularity.

Strong radio telescopes can detect CMB and it is almost the same strength from all directions in the universe, and not associated with any star or galaxy. It is thus more strong evidence of the *Big Bang* model of the universe. So, *Big Bang* refutes *Steady State*.

Discovery
of the
century, if
not of all
time.

Stephen Hawking (ref. 1974, '83, '87) called finding tiny variations in CMB “the discovery of the century, if not of all time.” The *Big Bang* is thought to be c.13.8 billion years ago. It is now thought that elementary particles and anti-particles were created within a fraction of a second after the *Big Bang*, followed by photons of radiation. In the next minutes, deuterium and helium nuclei formed when the temperature had dropped sufficiently. Then, matter interacted to form stars and galaxies resulting in a further cooling to the present observed temperatures.

1993 **Philosophy:** **Richard Rhodes**, in *The Making of the Atomic Bomb*, quoting chemist **Michael Polanyi** (1891-1976), Hungarian-Brit, said belief in science was a necessary requirement for one's full initiation into science. If science has become the orthodoxy of the West, individuals are nevertheless still free to take it or leave it, in whole or in part. Believers in astrology, Marxism, and virgin birth abound.

But “no one can become a scientist unless he presumes that the scientific doctrine and method are fundamentally sound and that their ultimate premises can be unquestionably accepted.” He made important theoretical contributions to physical chemistry, economics, and philosophy.

1993 **Theology:** **Plantinga** (ref. 1974, '77), in *Warrant and Proper Function* posited an argument for God he called *Reformed epistemology*, concluding that God can be rationally believed in without arguments or evidence but based on an innate sense of God given by God to humans, like **Calvin's sensus divinitatis**. His argument is familiar, a mystery, an “inate sense of God,” to solve a mystery, “God.” This appears to be abandoning his previous arguments which had been effectively refuted.

Recall, **Nietzsche** had ridiculed Christianity for using all imaginary concepts, “sin, forgiving sin, soul, grace, god, salvation, spirits, temptation by the devil, free will”, all imaginary concepts.

1995 **How we think:** **Lev Vygotsky**: “We think in concepts and words we know.”

James E Alcock, skeptic, psychologist, His article, *The Belief Engine*, “Our brains and nervous systems . . . evolved to assure not truth, logic, and reason, but survival.” (more 2018)

Depravity, Divine Responsibility, and Moral Evil	Philosophy, <i>Problem of Suffering</i> : Andrea Weisberger , philosopher, in <i>Depravity, Divine Responsibility and Moral Evil: A Critique of a New Free Will Defense</i> , said Plantinga's response to the <i>Problem of Suffering</i> (ref. 1977) argued there is a necessary connection between <i>free will</i> and the existence of moral human-caused evil. Plantinga had thought up and used the concept of " <i>transworld depravity</i> ," namely that in any possible world where one has substantial <i>free will</i> , he will commit at least one evil act. Weisberger disputed Plantinga's premise. She said the concept of <i>free will</i> in no way necessitates either the human capacity to act wrongly or the excessive amount of moral evil found in the world.
Plantinga refuted	The concept of <i>transworld depravity</i> says that people will do at least one evil act. Even if this were true, which is not proven, it only address part of <i>The Problem of Suffering</i> . It ignores suffering from natural causes. So Plantinga's new <i>free will defense</i> does not refute <i>The Problem of Suffering</i> .
1995	Philosophy, astronomy: Carl Sagan , (ref. 1968, '73, '80) published <i>Pale Blue Dot</i> : "I don't want to believe. I want to know." "Think of the rivers of blood spilled by all those generals and emperors so that, in glory and triumph, they could become the momentary masters of a fraction of a dot. Think of the endless cruelties visited by the inhabitants of one corner of this pixel on the scarce distinguishable inhabitants of some other corner, how frequent their misunderstandings."
Pale Blue Dot	
Sagan Quotes	"Our planet is a lonely speck in the great enveloping cosmic dark. In our obscurity, in all this vastness, there is no hint that help will come from elsewhere to save us from ourselves. The Earth is the only world known to harbor life. There is nowhere else, at least in the near future, to which our species could migrate. Earth is where we make our stand. It has been said that astronomy is a humbling and character-building experience. There is perhaps no better demonstration of the folly of human conceits than this distant image of our tiny world . . . How is it that hardly any major religion has looked at science and said This is better than we thought! The universe is much bigger than our prophets said, grander, more subtle, more elegant. Instead they say, 'No, no! My god is a little god, and I want him to stay that way.' "A religion, old or new, that stressed the magnificence of the universe as revealed by modern science might be able to draw forth reserves of reverence and awe hardly tapped by the conventional faiths. . . There are no forbidden questions in science, no matters too sensitive or delicate to be probed, no sacred truths." Sagan: Avoid intellectual arrogance thinking you have a monopoly on the truth.
Complex systems can evolve naturally	Biology, evolution: Michael Behe , a biochemist, re-raised the concept of irreducible complexity (ref. 1871) to support the theory of intelligent design (" <i>ID</i> "). He gave three examples to illustrate his theory.
1996	Niall Shanks and Karl Joplin , chemists, responded that those systems purportedly illustrating <i>irreducible biochemical</i> complexity can arise naturally and spontaneously as the result of self-organizing chemical precesses and that what evolved biochemical and molecular systems actually exhibit is "redundant complexity" - a kind of complexity that is the product of an evolved biochemical process.
Conflicting values is okay	Philosophy: Isiah Berlin , Brit, articulated a growing conviction among people that a monolithic society was not the ideal. He argued that there are a "plurality of values" which are numerous but not infinite. "Human values are values that I can pursue while maintaining my own semblance, my human character. . . within limits of what it means to be human, we can accept, and even embrace, conflicts of values." He said his words were not cultural relativism.
Catholics may accept evolution only if they believe God put a soul in man.	Biology: John Paul 2 admitted that evolution was "an effectively proven fact, but that there came a time in the evolution of humans, which science could not identify (and which <i>he did not</i> identify), which was solely within religion's domain, when God put a <i>soul</i> into the previously animal lineage [primate- <i>Hominid-hominim</i> -Modern man]." John Paul 2 said that Catholics could not accept any theory of evolution which denied this <i>ensoulment</i> concept or that people were created in the image and likeness of God." That is, God intervened in evolution. This turns <i>Darwinism</i> upside down. (more John Paul 2 1998-2000) [Skeptics say that God was made in the image and likeness of man.]
1996	Archeology: The first known man-made structures were discovered at Gobekli, SE Turkey, (ref. c.9000 BC).
"Conservatives" are radical statists. No business class has ever freely accepted free market discipline	Political Theory: Chomsky (ref 1957, '75) "There are no conservatives in America. The people who call themselves conservatives . . . are radical statists. They believe in a powerful state, which is a welfare state for the rich." "The most effective way to <i>restrict</i> democracy is to transfer decision-making from the public arena to unaccountable institutions: kings, . . . military juntas, . . . corporations." "Property rights are a different kind of right than free speech. My free speech doesn't interfere with yours, but if I own a property, you can't own it." "The smart way to keep people passive and obedient is to strictly limit the spectrum of acceptable opinion but allow lively debate within that spectrum." "No business class has ever been willing to subject itself to . . . free market discipline. (Frederick Douglass had expressed the same thought.) England, America, and others, resorted to massive state intervention to protect private power, and still do." Businesses spend millions lobbying Congress to receive special benefits and to avoid actual competition.

Original sin diminishes free will, so no free will defense

Niclas Berggren, Swede, atheist, "If one accepts **Paul** and **Augustine's** idea that Adam and Eve's eating the fruit of the tree of knowledge was so great that it caused all humans forever to have a propensity to sin, then people *do not* have the *free will* essential for the *free will defense*, so the *defense* fails. That is, *Original Sin* negates the *free will defense*. It's that simple. If one accepts *Original Sin*, one can't accept the *free will defense*. **John Paul 2** said in 1994 that *Original Sin* is basic to Catholicism. If God exists, he knew man would sin and created man anyway, so God is equally responsible for man's sins. (**Russell** had said the same in 1961)

Gould: Natural Selection advances survival-ability, not intelligence But they could be the same thing

Biology: Paleontologist **Stephen Jay Gould** (ref. 1859, 1900-39, '72) argued that evolution by *Natural Selection* is not linear progressing toward more complex and more intelligent organisms like Man, but is simply adaptations to local conditions through random genetic mutations and natural selection that help an organism's *survivability*

Darwinian *Natural Selection* remains paramount for those creatures in the wild governed strictly by nature, humans have overcome *Natural Selection* and are governed by other forces, such as ideologies, science, respect for human life, and other influences in modern society.

Humans have progressed culturally, which does not necessarily imply increased survivability. They may in fact reinforce each other. With modern man, most everyone survives and reproduces, not just the most fit. Inexplicably, **Gould** argued that religion and science don't conflict as they are in different non-overlapping *magisteria*. This "overlap" is likely **Gould's** best known error.

Neil deGrasse Tyson (1958-), American astronomer, disagreed with **Gould**, "Religions overlap science by making scientific pronouncements on matters like disease, comets, lightning. The *Bible* describes **Jesus's** virgin birth, his miracles, his divine father, his parting the Red Sea, Earth's creation. . .

"There is no common ground between science and religion." "The good thing about science is that it's true whether or not you believe in it." Science is based on seeking to understand reality. Theology is based on the idea that its ultimate reality is unknowable." (Fundamentalists have four views of creation, *Young Earth Creationism*, *Old Earth Creationism*, *Evolutionary Creation*, and *Intelligent Design*.)

1996 Religion, *Skeptical Theism*: Philosopher **Paul Draper** introduced an argument to refute the *Problem of Suffering / Evil* he called "Skeptical Theism. The central thesis of skeptical theism is that a God could have reasons for permitting evils which are beyond human comprehension.

That is, pointless evils may be necessary for a greater good or to prevent equal or even greater evils. So we must be skeptical of our ability to know why God permits evils and sufferings. This argument has two problems. One, it *assumes*, not *proves* a God. Two, God knowingly made humans too dumb to understand Him. So, one should be skeptical of both God's existence and His non-existence, and for that matter should be skeptical of every argument posited for a supernatural entity .

It seems that **Hume** disposed of this argument in 1751 when he said, "If God can justify a suffering for a reason incomprehensible to Man, what can the most moral religious man know what God wants? Philosopher **Scott Seoh** has persuasively argued that skeptical theism leads to moral paralysis.

Southern Baptists: Wives must submit to husbands

Theology, Baptist male supremacy: The Southern Baptist Convention, the largest Protestant denomination in the U S, declared that the *Bible* "has God as its author, salvation for its end, and truth, without any mixture of error, for its matter." "All Scripture is totally true and trustworthy." Including, "A wife is to submit graciously to the leadership of her husband."

Jimmy Carter, a life-long Southern Baptist, left the sect because of this.

Women are slaves in Islam

Muslim male superiority: **Taslina Naslin**, a Bangladeshi doctor, left Islam. "When I studied the *Qur'an*, I found many unreasonable ideas. Women were treated as slaves, sexual objects." She saw religious intolerance and oppression increasing, especially in Muslim countries, and especially against women.

1997 Women and errant priests are all Adam's fault.

Catholicism: **John Paul 2** declared that the Catholic Church had no authority whatsoever to ordain women and that this must definitively be believed by all faithful Catholics. The *Catechism of the Catholic Church* (p. 401-2 in the *Catechism*.) says that, "The Church has always taught that the overwhelming misery which oppresses men and their inclination towards evil and death cannot be understood apart from Adam's [*Original*] Sin, and the fact that he has transmitted to us, a sin with which we are all born afflicted . This sin affected the human nature." [**John Paul** thus discredited the *free will defense* by blaming Adam for limiting peoples's actual *free will*.] 4,500, or 4%, of active US priests, were the subjects of 11,000 allegations of sexual abuses. Other sects had similarly accusations.

1998 Dark Energy posited

Astronomy, dark energy: (ref 1980) Astrophysicists determined that over just the past 5 billion years, the universe was expanding faster than the perceived calculated amount of energy and mass in the universe would permit. This was one of the most important discoveries of the 20th century, contradicting the common sense idea that gravity was slowing down the universe's expansion.

Universe is expanding

So Cosmologists *inferred* that some unknown factor with anti-gravitational properties was causing such acceleration. Scientists called it *dark energy*. As it acts contrary to gravity, it was presumed to have no

faster than expected

mass. "Dark energy" is an unknown form of energy that affects the universe on the largest scales. The first observational evidence for its existence came from measurements of supernovae.

The biggest questions then facing cosmologists (apart from the origin of the universe and of life) were the nature of *dark energy* and *dark matter* (despite some evidence for **Milgrom's** 1988 MOND theory). *What Is dark matter or dark energy?* We don't know. **Michael Schermer**, "*Dark matter and dark energy* are [not necessarily actual matter or actual energy], but are merely linguistic placeholders until [we] figure out what causes unknowns of galaxies' movements. Astrophysicists also determined that space, considered empty, contains minute amounts of matter.

Kuhn's 1962 paradigms theory disputed

Science: Weinberg (ref 1968) said sciences did advance during **Kuhn's paradigm** periods (ref.1962), i.e., **Newton's physics** was changed/improved after he died becoming *Newtonian physics* compatible with relativity through the work of **Laplace**, **Lagrange** and others. **Weinberg** said **Kuhn** erred saying that it was near impossible for students of a new paradigm to see matters as they had been seen under the previous paradigm. He also doubted **Kuhn's** skepticism about what science actually accomplished.

Consilience, the Unity of Knowledge explains human events scientifically

Science: E O Wilson (ref.1975), "Science, its imperfections notwithstanding, is the sword in the stone that humanity finally pulled. The question it ultimately poses, of ultimately lawful materialism, is the most important issue that can be asked in philosophy and religion. Its procedures are [difficult] which is how it took so long to get started."

C P Snow had shown the two worlds of the humanities and science. **Wilson** proposed to explain the whole of human experience in terms of the natural sciences with his book, *Consilience, the Unity of Knowledge*, **Wilson** said, "We are drowning in information while starving for wisdom. Passion and desire are not the same as truth."

1998 Fides et Ratio

Catholic dogma further updated: Pope **John Paul 2** (ref. 1988, '93, '94, '96) issued *Fides et Ratio / Faith and Reason*. "Both are essential. Faith without reason runs the risk of withering into myth or superstition." Reason without faith can't reach the ultimate truths of existence." Reason's "systematic body of knowledge is incomplete".

The pope apologized for numerous Church injustices

During his papacy, **John Paul 2** apologized for the Church's denigration of women, for priestly sex abuses, for its treatment of **Galileo**, for African slaves, for murdering **Jan Hus**, for the Church's silence regarding the Holocaust, for Catholic involvement in the slave trade, for the actions of the Crusaders in the 1204 attack on Constantinople, for mistreatment of ethnic groups (showing contempt for their cultures and religious traditions), for those burnt at the stake, and for the wars of religion, but not for burning **Girodano Bruno**. The Vatican spokesman, said, "Given the number of sins committed over . . . twenty centuries, it must necessarily be rather summary.

Attenborough diminished the Design Argument

Theology: The Teleological / Design Argument: Sir **David Attenborough** (1926-), Brit, philosopher, naturalist, "I don't know [why we're on Earth]. People sometimes say to me, 'Why don't you admit that the hummingbird, the butterfly, the Bird of Paradise are proof of the wonderful things produced by Creation?' I always reply, you've also got to think of a little boy sitting on a river bank, here, in West Africa, has a little worm, a living organism, boring through the eyeball and is slowly turning him blind. The Creator God that you believe in . . . also made that little worm. I personally find that difficult to accommodate."

When creatures left the oceans for land

Paleontology: A fossil of an animal with fish features (gills, scales, fin) and tetrapod features (four legs, lungs, flexible neck, sturdy skeleton) dating to 375 Million BC was found in Canada. More fossils with fish and tetrapod features have been found.

Michael Brunet in Chad found a skull of the earliest known humans, dated to c6-7 million BC

1999

Theology, The Problem of Suffering: Gideon Rosen, philosopher, stated *The Problem* based solely on suffering from natural causes (earthquakes, drought). He said *evil* was a state of affairs that causes suffering to innocents. He accepted the normal definition of the monotheistic Abrahamic God, as, *inter alia*, omnipotent, omniscient, and all-benevolent. He said suffering can be considered "necessary" if it is a necessary condition to realize some great important good. He argued:

This has not been challenged

1. Premise. If God exists, he is perfect (omnipotent, omniscient, all-benevolent.) (by definition)
 2. Premise. Such God could prevent unnecessary natural evils that cause suffering to innocents. (Omnipotent)
 3. Premise. Such God would prevent unnecessary natural evils that cause suffering to innocents. (Benevolent)
 4. Therefore, if such God existed, there would be no unnecessary natural evils that cause sufferings to innocents. (From the premises)
 5. There *are* unnecessary natural evils that cause suffering to innocents. (Our experience), a contradiction.
 6. Therefore, One or more premise is false. So there is no perfect traditional monotheistic God."
- Rosen's** argument has not been refuted or even challenged. So, *The Problem of Suffering* stands.

21st Century John Paul 2 JP Moreland Ehrman EO Wilson Hawking

The Ten Great Ideas of Science

- Peter Atkins** named *The Ten Great Ideas of Science*.
- 1 Evolution proceeds by natural selection.
 - 2 DNA. Inheritance is encoded in DNA.
 - 3 Energy. Energy is conserved.
 - 4 Entropy. All change is the consequence of purposeless collapse of energy and matter into disorder.
 - 5 Atoms. Matter is atomic.
 - 6 Symmetry. Symmetry limits, guides, and drives.
 - 7 Quanta. Waves behave like particles and vice versa.
 - 8 Cosmology. Universe is expanding.
 - 9 Spacetime. Spacetime is curved by matter.
 10. If Arithmetic is consistent, it is incomplete.

2000 How did consciousness come about?

Theology: **J P Moreland** stated his *Argument from Consciousness* for God. (originated by **Arthur Balfour** in 1914). "How did evolution convert the water of biological tissue into the wine of consciousness?" **This** argument doesn't get one very far to proving God.
Consciousness does not infer any particular deity or value system. It's a clever question, but based on false implied premise that at some point a God infused humans with consciousness. It *falsely assumes* that Man's predecessors had no consciousness.

Animals evidence consciousness

First, water is totally irrelevant here except to infer a false dichotomy to wine. A coherent question could be, "How did human consciousness develop from a state of no consciousness."
 That question itself assumes that at some point humans (or, to be charitable, their ancestors.) did not possess consciousness. This assumption is false as scientists in more than discipline have long detected consciousness of varying degrees in nonhuman species.

Frans de Waal (1948-2024), an eminent Dutch primatologist, ethologist, professor of Primate Behavior's book *Our Inner Ape* (2005), showed that emotions are widespread among fish, birds, whales, dolphins, elephants and dogs who act like they had traits evidencing consciousness, like, cooperation, mutual aid, and mourning. **De Waal** showed that chimps and bonobos cry and laugh and get angry, with facial expressions to match. Other scientists have discovered less colorful but equally probative traits.

Not to evade the issue by attacking the premises, we can answer the simple question, "How did consciousness come about?" The best evidence is simply that consciousness in humans, a sense of self, evolved over eons, year by year, philosopher by philosopher, experience by experience, teacher by teacher. Humans in different locales developed various social and moral codes

2000 Consciousness developed slowly over eons of generations

The very first *Homo sapiens* presumably had the same degree of consciousness as their ancestors, that is, some. But they had bigger brains with the potential for more advanced thinking.

Consciousness evolved over eons. It took a great leap forward with **Augustine's Confessions**. Humans learned facts and ideas from thinkers. **Karl Popper** (ref. 1933-35, 40, 45, 57) said that mental processes evolved by natural selection based on the need to survive.

Nicholas Humphrey: "Consciousness evolved as humans liked being conscious."

Thomas Huxley: "If animals have consciousness and no souls, then it is clear that, in them, consciousness is a direct function of material changes."

Consciousness

Carl Jung, "Consciousness arises out of the depths of unconscious psychic life, at first, like separate islands which gradually unite to form a continent, a continuous landmass of consciousness."

Stephen Conifer: "There are several alternatives to theism that posit answers to how consciousness evolved, namely deism, pantheism, various Eastern "religions," and of course, experience."

Daniel Dennett's *From Bacteria to Bach and Back* says, "Human consciousness . . . is a product in large part of cultural evolution, which installs a bounty of words and many other thinking tools in our brains, creating thereby a cognitive architecture unlike the "bottoms-up" minds of animals."

Sociology: Cognitive scientists have not found any aspects of human thought or emotion that

require a non-physical explanation. **Edward O Wilson** predicted that neuroscientists would soon identify the physical basis of consciousness. Actually water does turn into wine, plant some grapes.

2000 Religion: **John Paul 2's Dominus** said Roman Catholicism "is the one true Church of **Jesus** Christ, the one path to salvation." Cardinal **Ratzinger** (later Pope **Benedict 16**, 2008-13) said this was a necessary response to religious pluralism, i. e., that one's religion is not the exclusive path to salvation.

2001 Several examples of sufferings with a religious basis.

2001, A 13 year old girl became pregnant after her father pimped her. An Islamic court gave 180 lashes.

2002, Mecca. The Whabbist *Commission for the Promotion of Virtue and Prevention of Vice*, Saudi police, beat school girls trying to escape a fire as they weren't wearing head scarves. 15 girls died.

Nigeria. Muslim rioters protested the Miss World pageant because contestants wore bathing suits, 250 died. "Down with beauty!" screamed the mob. "Miss World is sin! *Allahu Akbar!*" (*Vanity Fair*, June 2007)

2001 Philosophy, biology: **Kieth Parsons**: "A loving Creator could have done much better than create us through a process that depends upon the vast waste, pain, and ugliness of natural selection." **Hume** had listed four ways that a God, if one existed, could have created the world far better than ours.(1779)

2001 Theology: **Osama bin Laden** murdered 3000 innocents in New York's World Trade Center in the name of Allah. **Billy Graham** (ref 1949, 58) was asked why God permitted this evil killing.

After 2,000 years of Christian theologians proposing answers to *The Problem of Suffering*, he simply said that he didn't know. Two prominent TV Christians, however, did know.

Problem of Suffering solved

On TV, **Jerry Falwell** said, "The abortionists must bear some burden for this, for God will not be mocked. And when we destroy 40 million little innocent babies, we make God mad. I really believe that the pagans, and the abortionists, and the feminists, and the gays and the lesbians who are actively trying to make that an alternative lifestyle, the ACLU, People For the American Way, all of them who have tried to secularize America, I point the finger in their face and say, 'You helped this happen.'" **Pat Robertson**, the host of the Christian TV program, said, "I totally concur."

Why God allows suffering

Graham, a few days later announced that the 3,000 were safe and happy in paradise and would not return even if they could. (He knew?) His website in 2007 gave reasons why God allows suffering. He said, 1. that it gives one a greater sense of oneness with others who suffer. 2. it is a warning from God to be holy, and 3. We may better be able to comfort those who are in trouble. (Ref. *2 Corinthians 1:3-4*)

2002 Belief in one's Free Will predicts a good worker.

Psychologists **Kathleen Vohs** and **Jonathan Schooler** found that persons who have a weak belief in *free will* are more likely to act immorally. That is, when people believe that they are not free agents, they stop seeing themselves as blameworthy and give in to their baser instincts and act immorally.

Conversely, people who believe in their own *free will* are more likely to show up and do better work. Belief in *free will* was a better predictor of job performance than those with a self-professed work ethic. Other researchers found that a weak belief in *free will* correlated with lower academic performance.

Thinkers: Be humble

2002 Psychology: **Pascal Boyer's Religion Explained** says belief in God is due to evolutionary pressures; so the brain has a tendency to *agency* even when there is none. Belief in the supernatural becomes fixed in the brain as it's memorable. (**J S Mill** had said that people have a tendency to believe in *something*.)

Michael Shermer, "Skepticism "represents the essential balance between orthodoxy and heresy ." **Charles Sanders Pierce**, "There is always the possibility that we may be wrong."

2004 Dark Matter

Astronomy: The *Andromeda Galaxy* was estimated to have a trillion stars / suns, twice as many as our *Milky Way Galaxy*. *Andromeda Galaxy* and our *Milky Way* are moving toward each other faster than would be accounted for by their *visible* apparent masses based on the math of Newtonian gravity. So in billions of years the two galaxies could well meet. Astronomers posit that there must be some invisible dark matter (ref 1933, '74, '82) with gravitational attraction that keeps them gravitationally attracted together. Cosmologists don't know what dark matter is. How

2005 The School Board's action was breathtaking inanity.

Law: In *Kitzmiller vs. Dover School District* Federal Judge **John Jones** barred teaching *Intelligent Design (ID)* as *science* in public schools as it would unconstitutionally promote religion. Said " Public schools *may* teach *ID* in a course on religious beliefs or myths, but not as *science*. **Michael Behe** (ref. 1996) testified that *ID* was a legitimate scientific theory. **Jones** ruled that *ID* had been refuted by peer reviewed scientific articles and was not accepted by the scientific community. He said the School Board's approval of *ID* was "*breathhtaking inanity*" and *ID* was merely *creationism* relabeled. **Jones** even called the School Board members liars & unchristian for testifying religion had nothing to do with teaching *ID*.

- 2005 Christian Theology, *Design Argument*: **Christoph Cardinal Schoenborn**, Archbishop of Vienna, an associate of Pope **Benedict 16**, wrote in the *NY Times* that there was overwhelming evidence for purpose and design in modern science. He said also that *Darwinian* evolution was not true.
- Suffering based on religion** .2005, 17 Muslim countries demanded Denmark punish those who printed cartoons lampooning **Mohammed**. 2006, Afghanistan, following the *Qur'an* and Afghanistan's new *Constitution*, a Muslim man was killed for becoming a Christian. Islamic law (and the *Old Testament*) orders stoning adulterers and homosexuals.
- If you don't understand something?** 2006 Religion: **Richard Dawkins** ridiculed the *God of the Gaps* argument. (ref. 1950- **Einstein**)
 "Here is what the message that an imaginary 'intelligent design' theorist might say to scientists."
Just say God did it "If you don't understand how something works, never mind. Just give up and say God did it. You don't know how the nerve impulse works? Good! You don't understand how memories are laid down in the brain? Excellent! Is photosynthesis a bafflingly complex process? Wonderful! Please don't try to solve the problem, just give up, and say God did it. Dear scientist, don't work on your mysteries. Bring us your mysteries, for we can use them. We need them as a last refuge for God."
Dawkins says that invoking God as a reason for something is "the mother and father of all cop-outs."
- 2006 *Problem of Suffering*: **Graham Oppy** (1960-), Australian philosopher, agreed with **Mackie**, (ref 1955).
 "If there were a perfect being, it would be unable to create an imperfect universe" It is hard to see why a perfect creator either couldn't or wouldn't make a world where free agents always freely choose to do good.
- Live in reality.** Religion: **Loyal Rue** (1944-) a Christian philosopher, wrote, "The most profound insight in the history of humankind is that we should seek to live in accordance with reality. [i.e., without myths] Indeed living in harmony with reality may be accepted as a formal definition of wisdom."
- 2006 Biology, physics, chemistry: **Edward O Wilson** (ref.1975), "We are now at the edge of establishing the two fundamental laws of biology: All biological phenomena . . . those entities and processes that define life itself, 1. ultimately obey the laws of physics and chemistry, and 2. arose by evolution through *natural selection*."
- A defense to the problem of suffering is an argument just might possibly be true** Theology: **Peter van Inwagen** (ref. 1983) argued, in *The Problem of Evil*, that evils are an inevitable consequence of the separation of humans from God, and if God prevented all evils, men wouldn't become aware they need to be reconciled with God. His central argument (*the Consequence Argument*) is, "If determinism is true, then our acts are the consequences of the laws of nature and events in the remote past that we had nothing to do with, so the consequences of those things are not up to us."
 Regarding *The Problem of Suffering*, in 2003, he had said that the *problem* was a philosophical argument and, like most philosophical arguments, it fails. In his book, he said that the idea of a "defense" to *The Problem of Suffering* is the idea of "a story that is put forward not as true, but true for all anyone knows." (That is, not *obviously* false on its face.) In fact, the *Problem of Suffering* is not a philosophical argument. It is a simple logical problem about a theological issue.
- Free Will Defense criticized** 2007 Philosophy, Logic, *Problem of Suffering*: **Raymond D Bradley**, New Zealander, philosophy professor, published *The Free Will Defense Refuted and God's Existence Disproved*. (Recall, **Mackie** in 1955 said God *could* have created persons who always freely choose to do good. **Plantinga** replied in 1977, said his *Free Will Defense* could show that God could be consistent with evil using the principle that two propositions are consistent with each other if each of them were consistent with a third proposition.
Plantinga created a third proposition, namely a concept of *transworld depravity*, (namely that any moral person will do at least one evil thing in his life). He asserted that this concept was consistent with the existence of evil *and* consistent with God's *omnipotence*. He then declared victory.
- Plantinga's argument is based on an error** **Bradley** asserted that **Plantinga** made a fatal logical error. Namely, the principle that two propositions are consistent with each other if each one were consistent with a third proposition is valid *only* if the propositions are *wholly* consistent with each other, not just consistent with only a *part* of one of the propositions. He said that *transworld depravity* was only consistent with omnipotence of the God, but not consistent with omniscience or benevolence, the other principal attributes of the perfect God.
- No known challenge** **Bradley** further argued that the existence of transworld depravity, was entirely up to God. God could have created a world with or without transworld depravity. If the God in question was omniscient, he would have known the consequences of creating a world with transworld depravity. And if he did,, he bears command responsibility for the evils and sufferings that resulted from his decision.
 So **Plantinga's free will defense** failed, and **Bradley's** argument, like **Gideon Rosen's**

1999 iteration of *The Problem of Suffering*, have not been challenged.

2007 **William Rowe** (ref. 1979), said one could be an atheist and not be bothered by another's belief in a God.

2008 Shubin on the Design Argument The human body's poor design: **Neil Shubin's** *Your Inner Fish* showed that the human body could be much better designed. A few examples: birds have better eyesight, women's pelvis is too narrow for childbirth, arteries and laryngeal nerve take unnecessary complicated paths in the human body, the appendix is useless. Similar, 2019-**Nathan Lents**, 1932-**Aldous Huxley**, "Maybe this planet is another planet's Hell.")

2007-2008 Suffering with a religious excuse Instances of suffering with a religious basis:

2007. In Karoda, India, a boy and girl of the same clan married. Per Hindu law, both were killed.

2008. In Somalia, a 13 year old girl, **Aisha Ibrahim Duhulow**, was raped by three men.

An Islamic court convicted her of adultery. 50 men stoned her to death in public.

Brazil's Catholic Church excommunicated a mother who allowed an abortion & the doctor who performed it to save the life of her 9 year old daughter raped and pregnant by her stepfather. The Vatican approved.

2008 Biblical answers to the Problem of Suffering are easily refuted Biblical answers: **Bart Ehrman's** book, *God's Problem: How the Bible Fails to Answer our Most Important Question - Why We Suffer*, described the several biblical answers to *The Problem of Suffering*.
1. God punishes people for their infidelity. 2. Evil is due to Man's inhumanity to man (exercising his *free will*)
3. Suffering is redemptive. 4. Suffering is a test of faith, an answer popular among early Christians.
5. Suffering is caused by the forces of evil and God is not responsible, from which God will save us when he returns. **Ehrman** said these *Bible's* arguments are unsatisfactory and easily refuted.
Ehrman agreed that **Jesus** existed, but that he wasn't divine. He said that *Ecclesiastes* gives the existential solution; bad things happen but life brings good things. So live fully, enjoy life while you can.

Seminary students learn biblical analysis, but don't use it. **Ehrman** also said, "One of the most amazing and perplexing features of mainstream Christianity is that seminarians who learn the historical-critical method in their *Bible* classes appear to forget all about it when it comes time for them to be pastors. They are taught critical approaches to Scripture. They learn about the discrepancies and contradictions, they discover all sorts of historical errors and mistakes, they find that there are books that were at one time considered canonical but that ultimately did not become part of Scripture. They come to recognize that a good number of the books of the *Bible* attributed to an apostle were actually written by someone else, that in fact we don't have the original copies of any of the biblical books but only copies made centuries later, all of which have been altered. They learn all of this, and yet when they become ministers they appear to put it back on the shelf."

2009 Evangelical Christianity: **Gary Hensley**, Lt. Col., chief US Army chaplain in Afghanistan, a fundamentalist, told troops to be "witnesses for **Jesus**. We hunt people for **Jesus**. As Christians, we hunt them down. Get the hound of heaven after them, so we get them in the kingdom." Imams likely tell Muslims the same. Three percent of military persons are evangelical, but 87% of military chaplain applicants are Evangelicals and 60% of military chaplains are Evangelicals.

2009 Einstein Cosmological hypotheses: People once thought that the mere existence of matter proved that a God created the universe. **Einstein** showed that matter and energy were two aspects of the same thing.
In the early 21st century, it was found that there is an exact balance in the universe between the positive energy of matter and the negative energy of gravity, so no energy was required to produce the universe. The universe could have come from nothing.

2009 Scientific evidences of evolution. Biology, Evolution: **Jerry Coyne's** (1949-) (ref.1751,1950) book, *Why Evolution is True*, lists biologic evidences for evolution, namely: The fossil record, Embryology, Molecular, Presence of vestigial organs, Biogeography, Sequence similarity between species that are also observed as a time-dependent, change in junk DNA, and transitional fossils linking species. (More **Coyne** 2014)

Transitional fossils link water and land species. **Charles Darwin** had predicted such *transitional fossils*. They include *Tiktaalik* (transition between fish and amphibians); *Ichthyostega* (transition between amphibians and reptiles); Mammal-like reptiles (not classified one or the other); *Archaeopteryx* (transition between reptiles and birds); *Ambulocetus* (transition between land mammals and whales); early human fossils with ape-like skulls; and a series of terrestrial fossils between land animals and whales.

The evidence not only includes these transitional fossils themselves but that they are found in rock formations at levels between their putative ancestors and their more modern descendants.

2009 Dogma vs. scientific literacy: **Chris Mooney** and **Sheril Kirshenbaum's** book, *Unscientific America*, said that the best predictor of scientific literacy in a nation was the absence of its domination by religion.

- 2010 Cosmology: **Frank Wilczek**, 2004 Nobel, “a universe of “nothing” is *unstable*, a vacuum would undergo a spontaneous phase transition into something more stable, like a universe with matter. The most significant event of the 20th century was discovering the laws of matter itself, its particles, relativity, quantum physics.
- 2010 Epistemology: **Marcelo Gleiser**, astrophysicist, critiqued the search for the theory of everything, said that there is no final “right” to be arrived at, only a sequence of improved descriptions of the cosmos. He said, “Each era will describe the cosmos [in new ways.] that may be radically different from the preceding one.”
- 2010 Cosmology: **Stephen Hawking** (ref. 1974, ‘83, ‘87, ‘92) and **Leonard Mlodinow’s** *Grand Design* said that *M-theory*, a version of string theory, was the best candidate for a complete theory of the universe. *M-theory* is a family of theories, each of which well describes observations only in some range of physical situations. According to *M-theory*, there are multiple universes, all created out of nothing, without a god “Spontaneous creation is the reason there is something rather than nothing, how the universe exists, how we exist. It is not necessary to invoke God to set the universe going.”
- Matter was spontaneously created**
- Speech allows us to live together.** Cosmology: On page one of *Grand Design*, **Hawking** proclaimed, “Philosophy is dead.” *The Grand Design* said that no cosmological theory now being studied can reasonably be considered “knowledge.” . . . “The afterlife is a fairy story for people that are afraid of the dark” “We are just an advanced breed of monkeys on a minor planet of a very average star. But we can understand the universe. That makes us something very special. For several million years mankind lived just like the animals.” “Then something happened which unleashed the power of our imagination. We learned to talk and we learned to listen. Speech has allowed the communication of ideas, enabling human beings to work together to build the impossible. Mankind’s greatest achievements have come about by talking. Its greatest failures by not talking. It doesn’t have to be like this. Our greatest hopes could become reality in the future. With the technology we have, the possibilities are unbounded. All we need to do is make sure we keep talking.”
- We are an advanced breed of monkeys on a minor planet**
- 2011 Religion: **Plantinga** (ref. 1965, ‘77), known for his *free will defense* (1977), was an active enthusiast for *Intelligent Design*. He said that God guided evolution, an oxymoron. In 2011, in *Where the Conflict Really Lies*, he asserted that “there is no tension between science and religion, supposed conflicts between science and religion are due to science’s methodological naturalism, they go hand in hand.” His argument against evolution is that evolution by natural selection produces those traits best suited for survival, not truth. So natural selection is incompatible with truth. He presumably didn’t see a connection between understanding natural processes and survival. Scientists do.
- Plantinga: Science and religion don’t conflict**
- 2011-2014 2011. Pakistan officials sentenced a woman to death for asking what **Mohammed** had done for Man. 2011. The governor of Punjab tried to reform its blasphemy law. One of his Muslim guards killed hm. 2011. Bangladesh Muslim clerics ordered a 14 year old rape victim flogged. She died after 80 lashes. Libyan **Ghaddafi** soldiers raped 3 sisters. Their father killed them to “lift the shame from his family.”
- Sufferings with a religious basis**
- 2012, Islamists in Timbuktu publically gave a 15 year old girl 60 lashes for speaking to men on the street. 2012. The Catholic auxiliary bishop of Mumbai praised a blasphemy law (illegal to *outrage* religious feelings by insulting its religion) used to prosecute a man who exposed a fake weeping crucifix.
- Death for marrying a Christian** 2013-15 *Ansar Bangla*, Bangladesh Muslims hacked to death infidels, a blogger, doctors, teachers, gays. 2014, Sudan: A Christian girl (Muslim dad, Christian mom) sentenced to death for marrying a Christian. 2014, Muslims al-Shabaab, killed 28 bus riders who couldn’t recite a part of the *Qur’an*.
- 2011 Psychology: **J Anderson Thomson** and **Clare Aukfor’s**, *Why We Believe, A Concise Guide to the Science of Faith*, argued that physical characteristics of the brain have caused it to be receptive to belief in a god(s). Religions benefit from brain features, like its susceptibility to ritual, repetition, trance states, a propensity to follow a father figure, and a predisposition to ascribe a human cause for natural events. Reason is irrelevant. Plus, importantly, people want to think they *matter* in some way, to *be* somebody. Priests tell people that they *matter* to God. God sent his son to save you. God loves you, and a dozen other psychological predispositions for faith, to induce feelings of security and euphoria. [Saying “I love you” tells someone that they *matter*.]
- Why we Believe: Religions comfort us. Priests tell people that they matter to God**
- Why We Believe** **Thomson** and **Auker** say that religions provide a sense of identity; they connect people to an enduring set of values. Such characteristics, for example, cause people to believe the *Bible* even after 150 years of analyses and studies detailing its factual unreliability. *Why We Believe’s* premise is that God is a man-made construct. It focuses primarily on Christianity. Belief can be more

Belief is easier than thinking

compelling than reason. It's also easier. The ad industry is based on this idea.

Bertrand Russell: "The main reason why people believe in God is simply because this belief is inculcated in them from early infancy. We believe, first and foremost, what makes us feel that we are fine fellows."

2011 Philosophy: **Michael Shermer**, wrote *The Believing Brain*. "[E]volution is not a religious tenet, to which one swears allegiance or belief as a matter of faith. It is a factual reality of the empirical world. Just as one would not say, 'I believe in gravity,' one should not proclaim 'I believe in evolution. Anything that generates a sense of awe may be a source of spirituality. Science does this in spades."

2011 Psychology: **Deborah Kelemen**, professor, Boston U., said children tend to think that things happen because someone caused it. The more basic question is, "Why do they think that?" The most likely reason is **Russell's** explanation. It's what they were told from infancy. And all known folk religions and creation myths have non-natural agents who *cause* things.

Belief overrules critical thinking

Other reasons how belief overrules clear critical thinking; We *believe* because: 1. we fear death, 2. we had a religious experience, 3. we have a need for a meaning to life. If we know nothing else, we could well believe that the Sun god rides in a chariot from one side of the world to the other every day, that the priest telling us that God has some kind of magical power, thus must be obeyed.

One miracle is as easy to believe as another

Modern believers scoff at ancient myths yet accept supernatural claims in their holy scriptures.

But, belief in the supernatural is belief in the supernatural, ancient or modern. **Robert Ingersoll:** "The naked savage, worshiping a wooden god is the religious equal of the robed pope kneeling before an image of the Virgin." **William Jennings Bryan:** "One miracle is just as easy to believe as another."

Brooks Atkinson, a film critic, argued that people everywhere enjoy believing things they believe are true. It spares them the ordeal of thinking for themselves and taking responsibility for what they know.

Islam, Judaism, and Christianity are particularly concerned about sexual practices. A new theory, *Reproductive Religiosity Theory*, argues that religions are not about group cooperation but about making their world more conducive to their own approaches to sex, marriage, and reproduction, matters of social utility and control.

2011 **Seth Mnooin**, science writer, "For [my son's] sake and for everyone else alive, I hope he grows up in a world where science is acknowledged not as an ideology but as the best tool we have for understanding.

2011 Psychology: **Daniel Kahneman's** (ref. 1975, '78) *Thinking Fast and Slow*, described how people can make fast emotive unconscious biased decisions or plodding hand-programmed, reasoned decisions. He debunked the notion that people act rationally and therefore the stock market is rational. (Every stock market trade is a mistake for buyer or seller. Stocks go up or down. If the stock goes up, the seller made a mistake selling. If the stock goes down, the buyer made a mistake buying.)

2012 Bad Science: *Nature* magazine said 47 of 53 "landmark" cancer studies printed in the top three journals from "reputable" labs could not be replicated. Bayer labs found similar results. See 2015 for similar occurrences.

Science studies's articles may be wrong

Pseudoscience / Pseudo-experiments: can be caused in many ways, including situations based only on anecdotes or on too small a sample of examples, or cherry picking examples, or fallacious reasoning (443) or simply desire for recognition, prestige.

Richard Harris, American, a science journalist, says, "Each year about a million biomedical studies are published in scientific journals. And many of them are simply wrong." Science is plagued by numerous pseudo-sciences seeking to use the prestige of science for personal gain. (More, 2015)

No gentle way to put it. Racists may just be dumb.

Psychology: Two 22 year studies in the UK linked low intelligence in children (tested at 10-11) with racism as adults, said **Gordon Hodson**, lead researcher at Brock U in Ontario in the journal *Psychological Science*. Low-intelligence children became low-intelligence adults (tested again at 30-33) who had socially conservative ideologies, which stress hierarchy and resistance to change.

Hodson: "There's reason to believe that strict right-wing ideology might appeal to those who have trouble grasping the complexity of the world." **Stephanie Pappas** summarized the study. "There's no gentle way to put it. People who give in to racism and prejudice may simply just be dumb."

John Stuart Mill told Parliament in 1869, "Stupid persons are generally conservative. I believe that so obvious and undeniable a fact that I hardly think any honorable gentleman will question it."

God has a

Philosophy, *Problem of Suffering:* **Luke Maring**, professor of philosophy, reasonably argued that

duty to prevent suffering like any person in a position of trust and authority.

if a God exists, it, as an authority figure, would have the *duty* to prevent suffering of innocents.

As authority figures like parents, governments, and fiduciaries, priests have not only the power to command others do certain things, but also have an ethical *obligations* to take appropriate action, to not be passive. In common and legislative law, fiduciaries have affirmative duties to protect their wards. Parents are required by any ethical code as well by law to care for their children.

The traditional arguments replying to *The Problem of Suffering* have not raised the *possibility* of God's *duties*. If God, the ultimate authority, existed, current moral codes would say He had a *duty*, not just the power, to prevent suffering. This would negate all theodicies and defenses. God's inaction would negate his benevolence. Nowhere in the *Bible* says that God has *any* obligation to help people.

Especially as God is claimed to be all-loving, benevolent

The Bible asserts God is all-loving, In *Isaiah*, God said He would help people and some verses relate incidents where God did good things, feeding thousands with a few loaves and fish and a couple dozen verses where he cured individuals. but nowhere Does the *Bible* say He had a *duty* to help people.

The most popular argument against the *Problem of Suffering*, the *free will* defense, actually argues that God does not prevent evil-doers causing suffering as it would contradict God's great gift of *free will*. Believers have not raised the issue of God's *duty* re suffering. Using the *free will defense*, they are content with a mere *possible* compatibility of God and suffering. If God had a duty to help, there are millions of situations where He would have to act. If God acts out of love, He has an option.

2012
The Better Angels of Our Nature

Philosophy: Steven Pinker, *The Better Angels of Our Nature*: "The scriptures present a God who delights in genocide, rape, slavery, and the execution of nonconformists, and for millennia those writings were used to rationalize the massacre of infidels, the ownership of women, the beating of children, dominion over animals, and the persecution of heretics and homosexuals.

Humanitarian reforms such as the elimination of cruel punishments, the dissemination of empathy-inducing novels, and the abolition of slavery were met with fierce opposition in their time by ecclesiastical authorities and their apologists . . . It's natural to think that living things must be the handiwork of a designer. But, numerous factual errors of **Aristotle** were thought true for millennia, like geocentrism. Overcoming naive impressions to figure out how things really work is one of humanity's highest callings."

2012
A Universe from Nothing

Cosmology: Lawrence Krauss's *A Universe from Nothing, Why (How) There is Something Rather than Nothing* links quantum physics to **Einstein's** theory of relativity, and says "nothingness" is *unstable*. (Also **Wilczek's** idea.) The universe popped into existence as a quantum fluctuation.

Due to quantum mechanics and special relativity, empty space consists of a bubbling brew of virtual particles spontaneously popping into and out of existence on time scales too small to notice.

Krauss Quotes

If one applies quantum mechanics to gravity, not only can a universe spontaneously appear from nothing, it must. Every atom in your body came from a star that exploded.

And the atoms in your left hand probably came from a different star than your right hand. It really is the most poetic thing I know about physics: You are all stardust.

You couldn't be here if stars hadn't exploded, because the elements- the carbon, nitrogen, iron, oxygen, all the things that matter for evolution and for life - weren't created at the beginning of time.

They were created in the nuclear furnaces of stars, and the only way for them to get into your body is if those stars were kind enough to explode. So, forget the supernatural. The stars died so that you could be here today." The declaration of a First Cause in a cosmological argument still leaves open the question, "Who created the creator?" What is the difference between arguing in favor of an eternally existing creator versus an eternally existing universe without one?"

"I think one of the big misunderstandings and abuses of the discussion of science is that science takes away spirituality, which is really awe and wonder and a sense of something bigger than oneself. Being completely insignificant is uplifting and can be a spiritual experience."

2012 **Hawking** (ref.1983,'87, '92, 2010), answered **Einstein's** comment that God does not play dice with the universe, "Not only does God play dice, he sometime throws them where they cannot be seen."

2012
Cosmological Argument

Fundamentalism: William L Craig is a prominent Fundamentalist Christian known for justifying the massacre of 20 children and six teachers at the Sandy Hook school as a part of God's divine plan. He analogized it to **Herod's** willing the killing of Canaanite children as he "knew that if these children were allowed to grow up in . . . Jewish society, this would harm the Jewish state. *Deut. 20:13-15*.

He also said that the *tsunami* that killed hundreds of thousands, mainly non-Christians, also "fit into God's master plan of building the kingdom of God" and natural disasters and wars "are permitted with

the view towards God's bringing the maximum number of people freely into relationship with Himself."

Problem of Suffering has a hidden premise no one has found

Regarding *The Problem of Suffering*, **Craig** says "No philosopher has been able to identify the problem's hidden premise." If this is true, then **Irenaeus, Cicero, Carneades, Clement of Alexandria, Boethius, Gregory the Great, Martin Luther, Spinoza, Aquinas, Malebranche, Augustine, Pelagius, Lactantius, Leibniz, C S Lewis, Plantinga, Hick**, and even **Calvin**, all did not understand *the Problem of Suffering* as well as he does. In fact, they all saw the logic of the problem and most devised arguments to defeat it.

Craig relies on **Plantinga's** arguments on *The Problem of Suffering* which has been shown to be logically faulty by philosophers **Weisberger** (1995), **Bradley** (2007), **Meslar** (2014), philosopher **Luke Maring's** assertion that God has a duty to prevent unnecessary or gratuitous suffering (2014), and **Gilbert Rosen's** 1999 iteration of the *Problem of Suffering* which has not been challenged or refuted. **Craig** says atheists have the burden of proof there's no God and they feel there's nothing wrong with rape.

2012
Sam Harris Quotes

Psychology: **Sam Harris's** book *Free Will* asserted that humans have no *free will* and we are better off without the concept. "Illusions, no matter how well intended, like belief in *free will*, always hold one back. Jail is now used to keep people from doing wrong, but if we better knew what is causing people to do things, we could better *prevent* bad behavior . . . Even the worst criminals didn't pick their parents, their brains, their upbringing, their culture. The big problem is that people confuse determinism with fatalism. Determinism is a belief that our decisions are part of a chain of cause and effect. Fatalism is a belief that our decisions don't really matter."

Atheism is not a philosophy

Atheism is not a philosophy; it is not a view of the world; it is merely the belief that there is no reliable evidence of God, and thus no God. Some feel that 'atheism' is a term that need not exist. No one needs to identify himself as a 'non-astrologer' or a 'non-alchemist' or non-doctor. Atheism does not infer capitalism, socialism, libertarianism, vegetarianism, or any other belief.

Atheism says no evidence for God

In **Harris's** book, *Letter to a Christian Nation*, "[**George W Bush**] has claimed, more than once, to be in dialogue with God. If he said that he was talking to God through his hair dryer, this would precipitate a national emergency. I fail to see how adding a hair dryer makes the claim more ridiculous or offensive. Man can build a nuclear bomb and still believe that he will get . . . virgins in Paradise."

Sam Harris Quotes

"According to the most common interpretation of biblical prophecy, **Jesus** will return only after things have gone horribly awry. Imagine the consequences if any significant component of the U.S. government believed that the world was about to end and that its ending would be glorious. [Nearly half of the American population apparently believes this.]

2013
Analogies can mislead

How we think: **Douglas Hofstadter** (ref 1953, '62) and **Emmanuel Sander**, "All thinking, from the superficial to the most profound, is based on analogy." They say **Einstein**, usually seen as a logical and mathematical genius, thought primarily in analogies. A problem with analogies is that helpful analogies are rare and when purportedly analogous matters are *dissimilar*, analogies mislead. In fact, the authors say most analogies are false and therefore useless as they usually compare dissimilar matters.

2013 **Jon Haidt**: Some moral attitudes, like fairness, loyalty, authoritarianism, have physical bases in men's brains.

2013 Physics: The last particle of the *Standard Model of Particle Physics* (1974) was thought to have been found when the **Higgs** Boson, was identified at the Large Hadron Collider near Geneva. It gives mass to particles.

2013
Capitalism is idolatrous

Economic Theory, capitalism: Pope **Francis** (1936-2025), first Jesuit pope, criticized the excesses of capitalism as the "dung of the devil. Capitalism is idolatrous, which needs to sacrifice human lives on the altar of money and profit." "Today everything comes under the laws of competition and the survival of the fittest where the powerful feed on the powerless."

Capitalism automatically causes inequality

Capitalism: **Thomas Piketty**, (ref. 1913, 2013, '20, p. 400), French economist, with statistics covering 300 years, said that the rate of return on inherited wealth grows faster than the rate on compensated labor. Thus, "Capitalism automatically generates arbitrary and unsustainable inequalities that radically undermine the meritocratic values on which democratic societies are based. (More **Piketty** 2020) **Will Durant**, (1968) "The only reasonable way to address the injurious wealth inequality is a progressive global tax on wealth, which requires global transparency of accounts and ending foreign tax havens."

Tolerating Gays

Catholicism: Pope **Benedict 16** (2005-13) had called homosexuality a "moral evil." But Pope **Francis** (2013-25) said, "Who am I to judge?" **Francis's** tolerance and reason undermined 2000 years of

Christian arrogance as the harsh judge of human sexual behavior. **Francis** also said that the *Big Bang theory* required a divine creator, and that evolution required the creation of beings to evolve.

Biologists state that the only living things on earth for three *billion* years were one celled organisms. **Francis** also said that God was not able to do everything.

786 babies' bodies found

Catholicism: In Tuam, Ireland the bodies of 786 babies who died between 1925 and 1961 were discovered in the septic system of the *Bon Secours Mother and Baby Home* run by Catholic nuns. Unmarried pregnant Catholic girls were sent there to give birth. There were no coffins or headstones

- 2014 Jihad: Six Muslim jihadists attacked a school in Peshawar, Pakistan. They burned a teacher before her students, killed 132 children and 13 adults. They took no hostages. They had no list of demands. They intended to die to become martyrs. They weren't clinically crazy, simply true believers. A Pakistani Taliban explained. "Human life only is valued by worldly materialists. Our real destination is Paradise. For us, death is the start of an existence more beautiful than this. If your faith is pure, you will glory their going to Paradise." **Voltaire**: Anyone who can make you believe nonsense can make you commit atrocities.

Problem of Suffering: Transworld depravity, is internally inconsistent

Philosophy, Problem of Suffering: **Sean Meslar**, philosophy professor, in *Transworld Depravity and Divine Omniscience* said: despite **Plantinga's free will defense's** wide acceptance, the central notion of the defense, namely, *transworld depravity*, is internally inconsistent, and that attempts to resolve the problem would result in abandoning the original terms of the discussion. This nullified **Plantinga's free will defense**.

- 2014 Evolution: A 375M BC fossil indicated that legs evolved from hind fins, not vice versa, as previously thought.

- 2014 Religions: **Jerry Coyne** (ref. 1751, 1950, 2009), philosophy professor, asserts that those religions that see their God as an anthropomorphic entity who has a personal relationship with his believers and gives them a moral system commit the bulk of harm committed in the name of religion.

Standard Model of Cosmology

- 2014 *The Standard Model of Cosmology* a/k/a the *Standard Model of the Universe*, was published.
1. Physical laws are the same everywhere.
 2. The universe is cooling and expanding from a single dense hot point explosion c.13.8 billion years ago.
 3. The early universe was a soup of energy and matter.
 4. The cosmos first made elementary particles (leptons, quarks). They combined to become protons and neutrons. (Electrons themselves are elementary particles.)
 5. Galaxies, stars, planets formed after a few hundred million years **after creation**.
 6. The universe looks the same in every direction and is homogeneous (That is, on a large scale the distribution of galaxies is even.)
 7. General relativity accurately describes the behavior of gravity everywhere.
 8. The universe is evolving (light elements were made first).
 9. The total mass-energy of the universe is 4.6% "Baryonic" visible matter (protons, neutrons, electrons, comprising gas, dust, stars, planets, people), 24% Dark Matter and 71.4% Dark Energy. But DE and DM are *assumed* but not proven to exist. They are not visible and not understood.
- The *Standard Model* has certain uncertainties, like DM and DE and it assumes that **Einstein's** theory of *General Relativity* is valid for all distances in the universe. Cosmologists continue to study these.

Three revolutions shaped Man's destiny

- 2014 Biology, Evolution: **Yuval Noah Harari's** (ref. 1484, 1532, 1933) book, *Sapiens*, Three momentous revolutions irrevocably shaped the destiny of humans,
1. the *Cognitive*, 2. the *Agricultural*, and 3. the *Scientific* revolutions.
 1. The *Cognitive* revolution arose from the emergence of the massive neo-cortex of the *Hominid's* brain. This enabled language that let social animals talk and think in abstract concepts, like religion, which bonds large groups of people. The most interesting place in the world today in religious terms is Silicon Valley. Techno-religions will replace liberalism's cult of the individual as big data overwhelmingly surpasses the predictive power of our feelings and intuitions. Humility. You are not the center of the universe. Post-Truth. Some fake news lasts forever. Immigration. Some cultures might be better than others.
 2. The *Agricultural* revolution caused people to expand their habitats and multiply their genes. It also caused most people to labor constantly, even more than they had done as hunter/gatherers.
 3. The *Scientific* revolution of the last few centuries let humans gain immense power fueled by imperialism and capitalism. With the ideas of the *Enlightenment*, science overpowered superstition. The brain hasn't changed in 30K years. It hasn't brought happiness or ease. The technological powers

humans have made have brought much human suffering.(More **Harari** 2018, pp. 394, 402, 420, 440)

2015
**Knowledge
is not power.
Power is
power**

Philosophy: **Paul Krugman** (1953-), economics professor, corrected **Francis Bacon's** reputed phrase "Knowledge is power." He said, "Knowledge is not power. Power is power." **Yuval Harari** (2014) in 2016 told how to get power, tell a story (even a false story) that many people believe gives one power. Recall **Hitler** at huge rallies told his followers that he would make Germany a great nation once again and that Jews were the cause of Germany's ills. It was popular. Many people believed him. So he had power. *Mein Kampf* said people are more likely to believe a big lie than a small one.

The Vatican Pontifical Council on Culture held a conference to discuss domestic violence, the objectification of women's bodies, and the role of women in Catholicism. No women were invited. The participants started with Catholic premises about women and sought to rationalize these views.

2015
**Neil
deGrasse
Tyson**

Cosmology, Gravitational waves: The Advanced Laser Interferometer Gravitational Wave Observatory in Washington state, and its twin in Louisiana, 10 milliseconds later, detected two massive black holes colliding, 1.3 billion light years away, 29 and 36 times bigger than the Sun. The collision emitted gravitational waves. **Neil deGrasse Tyson** (ref. 1914, '33, '97) explained that this black hole collision occurred billions of years ago when Earth had only simple, single-celled organisms. While the wave moved through space in all directions, Earth, after another 800 million years, evolved complex life, including flowers and dinosaurs and flying creatures, and a branch of vertebrates called mammals.

Among the mammals, a sub-branch evolved primates. A single branch of primates developed by a random genetic mutation a sub-branch with larger frontal lobes that enabled complex thought and allowed speech. That branch, Modern humans, invented agriculture and civilization and philosophy and art and science. All in the last ten thousand years. (A speck of cosmic geologic time.)

Astronomy, Mars: NASA confirmed that there is water on Mars. Vast heavy black holes have been detected at the center of some galaxies. (See the *Astronomy Timeline*, pp. 432-437).

2015
**Hitchens
Quotes**

Philosophy: **Christopher Hitchens** (1949-2011) British-American author, atheist, defended atheism against the charge that Nazism was the result of the work of **Charles Darwin**. He said, "It is a filthy slander. **Darwin** was not taught in Germany. Darwinism was so derided in Germany along with every other form of unbelief that all the great modern atheists, **Darwin, Freud, Einstein**, were alike despised by the . . . the most notorious 20th century totalitarianisms . . . the most ruthless . . . Nazis. **Hitler's** *Mein Kampf* said that he's doing God's work [when] destroying the Jewish people." "The *Fuhrer* (leader) oath that every officer of the Party and the Army had to take . . . begins, "I swear in the name of almighty God, my loyalty to *der Fuhrer*."

**Do Muslims
kill so only
they live?**

El-Sisi, president of Egypt, said, "Departing from the text of *the Qur'an* has become impossible. It is antagonizing the entire world. Is it possible that 1.6 billion [Muslims] should want to kill the rest of the world so they may live?"

Blasphemy

The Pew Center: Nearly half of countries have criminal laws against blasphemy or defamation of religion. Over 55% of US universities have speech codes that prohibit Constitutionally protected speech.

**Kuhn's
paradigms
disputed**

Science: **David Wooten's** *The Invention of Science; A New History of the Scientific Revolution* disputed **Thomas Kuhn's** 1962 *paradigm* theory. **Wooten** stated that there were a series of events, principally global exploration and discovery causing the scientific revolution, and that the history of science needs to be rethought through the prism of the humanities, and rewritten in the context of the times. In other words, non-scientific intellectual environment helped the adoption of the *scientific method*.

2015

Paleontology: **Sonia Hartman** and colleagues wrote in *Nature* that they found 3.3-million-year-old stone tools in Lomekwi 3, West Turkana, Kenya, a time when australopithecines, with chimp sized brains, were the smartest savannah-dwelling Hominims. This discovery showed clearly that *technology* preceded the brainy *Homo* species by over *one million* years.

**Democra-
tization of
science:
Printing,
Education,
knowledge
of self.**

Philosophy: **Michael Shermer** (ref 2011), The biggest news story over the past quarter century – that will continue to underlie all the currents . . . of individual sciences going forward – is the democratization of scientific knowledge. The first wave of scientific knowledge came with printing. The second wave came after WW 2 with the the idea that a college education was necessary. The third wave began around 1990 with the *Third Culture*, those scientists and other thinkers in the

empirical world who, through their work and expository writing, are taking the place of the traditional intellectual who are rendering visible the deeper meaning of our lives, redefining who & the what we are.

Science is not a seamless advance of knowledge

Bad science: The number of scientists exploded in the 20th century, in commerce, research, teaching. In the academic world the phrase “Publish or Perish” is common. It caused academics and scientists to produce studies to be recognized. Such studies had to be published somewhere. So an industry developed to print scholarly articles. Prestigious academic journals have high standards for publication.

The problem of lesser quality academic and scientific studies

Some publishers got in the business by having low standards and by charging scholars to print their studies. Under pressure to produce, some scholars produced studies of imperfect quality. *Nature Magazine* reported a large amount of probable fraud by scientists, namely, that a leading scientific publisher retracted 64 articles in 10 of its journals due to authors gaming the system.

In 2016, *Nature Magazine* surveyed 1,576 researchers. A majority of them had tried and failed to reproduce other scientists’ experiments as well as their own. **Jeffrey Beale**, a college librarian in California published a list of over 300 “predatory” journals (mainly outside the US) that print “scientific” articles for a fee without any peer review or editorial input.

Needless to say, the “predatory” journal industry fought back. The Federal Trade Commission sued one company that published hundreds of such journals. The FTC alleged many kinds of fraud, principally deceiving and cheating the scholars who wanted their articles published. The court found the company, OMICS Group, guilty of numerous offenses and ordered it to pay a \$50M fine.

Overall, “scientific” studies that had to be retracted rose tenfold during 2002-2012. Science as such seeks an objective reality independent of the admitted faults of scientists. The problem of lesser quality academic and scientific studies and predatory publishers got so severe that retractions of “scientific” studies are documented and tracked on a website, *retractionwatch.com*

**2015-19
Suffering with a religious basis**

2015: Muslims murdered 12 journalists for ridiculing **Mohammed**. A few days later killed four Jews. In Saudi Arabia. A Muslim court sentenced a young man to death for renouncing his Muslim faith. 2017, London. **Khalid Masood** told a relative, “You will soon hear of my death, but don’t worry, be happy, I will be in a better place. I will be in paradise.” A week later, he drove his car into a crowd, killing 5, injuring 50. 2019, In accordance with *Shari’a* law, Brunei enacted a law to kill adulterers and homosexuals by stoning.

2016 Psychology, Political Theory: **Shanto Lyengar** and **Sean Westwood** published *Fear and Loathing Across Party Lines: New Evidence on Group Polarization*. It asserted that prejudice due to politics or ideology is greater than racial, religious, or gender prejudice.

**2016
Basic political theories**

Political Theory: Historian **Colin Woodard** said the writing of the American *Constitution* illustrated “the epic struggle between individual liberty and the common good.” All political theories are variations of this struggle. In 1787, individual liberty in America was at its peak due to a weak government.

In the state of nature as well as under feudalism as well as much of the world today, the most powerful and ruthless rule by force. Institutions, like a tribal council and rules of conduct developed to promote the common good. The **Hammurabi** code was instituted to insure that the strong not oppress the weak. Today, however, when “individual liberty” is invoked, it usually is invoked by businessmen who oppose laws and regulations adopted to *protect* customers.

2016 Law: In Italy, a homeless destitute man stole \$5 worth of food. He was sentenced to 6 months and fined \$115. Italy’s highest court freed him, said, “In a civilized country, not even the lowest of men should starve.”

Hydrogen is 74+% of the universe

Cosmology: **Neil deGrasse Tyson** (ref.1933, ‘97, 2015) wrote *Astrophysics for People in a Hurry*, “With only one proton in its nucleus, hydrogen is the lightest and simplest element, made entirely during the big bang. Hydrogen atoms are more than 2/3 of all the atoms in the human body out of the 94 naturally occurring elements and over 74% of all atoms in the cosmos. (Helium is next at 25%) Hydrogen in the core of the massive planet Jupiter is under so much pressure that it behaves more like a conductive metal than a gas, creating the strongest magnetic field among the planets.

There’s no common ground between science and religion

“We are stardust brought to life, then empowered by the universe to figure itself out and we have only just begun.” “There is no common ground between science and religion.” “To sense that behind anything that can be experienced there is a something that our minds cannot grasp, whose beauty and sublimity reaches us only indirectly: this is religiousness. In this sense I am religious. To me it suffices to wonder at these secrets and to attempt humbly to grasp with my mind a mere image of the lofty structure of all there is.”

Carbon is versatile

Tyson: "Carbon is in more kinds of molecules than all other kinds of molecules combined. Given the abundance of carbon in the cosmos (forged in the cores of stars), churned up to their surfaces, and released into the galaxy, a better element does not exist on which to base the chemistry and diversity of life. The second most abundant to hydrogen in living organisms is oxygen, third is carbon.

All forged and released in the remains of exploded stars. Both oxygen and carbon are ingredients of life as we know it." (Every second, the Sun converts 5M tons of its mass into energy. In a billion years it will burn away under one ten millionth of its mass.)

In science, conclusions come last. In religion, conclusions come first.

"During our brief stay on planet Earth, we owe ourselves and our descendants the opportunity to explore, as the day our knowledge of the cosmos ceases to expand, we risk regressing to the childish view that the universe figuratively and literally revolves around us.

In that bleak world, arms-bearing, resource-hungry people and nations would be prone to act on their low contracted prejudices.' and that would be the last gasp of human enlightenment - until the rise of a visionary new culture that could once again embrace, rather than fear, the cosmic perspective."

2017 **Political Theory, nationalism:** **James Madison** said the US is "a republic, not a democracy," He designed a two stage "constraint" on democracy for US presidential elections so the winner was not the one with the most votes but the one with the most state legislature-appointed "electors." This Electoral College has given the presidency to the popular vote loser four times..

2015 **Edward O Wilson:** (ref.1975, 2000) Religions ought to be eliminated for the sake of human progress as they were dragging us down. All religions look down on all others. Said, "I'm not an atheist or agnostic; I'm a scientist; most math theorems are actually translations from already existing scientific theories.

2018 **Philosophy:** **Richard B Davis** and **W Paul Franks**, professors of philosophy wrote, "**Plantinga's** defense and his theodicy are incompatible." If his *free will defense* succeeds, his theology fails.

2018 **Psychology:** **James Alcock's Belief: What It Means to Believe and Why Our Convictions Are So Compelling** says there is nothing fundamentally different about the nature of beliefs that we consider rational and those we consider irrational. We do not choose our beliefs; they are generated and maintained through automatic processes in our brain. Memories are unreliable.

Super-natural belief is a natural result of normal cognitive development.

False memories can be implanted. Beliefs and emotions influence each other. Logic doesn't come naturally. It can be trumped by emotion and intuition and bias. The chapter, *The God Engine*, says that belief in the supernatural is a natural consequence of how our brains work.

When someone doesn't understand a phenomenon, he or she may unconsciously thinks it's due to a supernatural force. A botanist or a chemist or a physicist may be able in one second to explain the happening. But most people don't have such knowledge. Recall **Barbara Body's** 1970 interviews of hundreds of earthquake survivors. Not one person recognized it was a natural event.

Emotion & intuition can trump logic.

Priests provide answers. Not just to trivial questions like why do we have high tides but absolutely intelligent important questions such as "How are we here? Do our lives have meaning?"

The one truly serious philosophical question is, "Should I get out of bed?"

Religions provide a bulwark against existential anxiety and fear of annihilation; They can provide a greater sense of control; they can provide companionship beyond being a member of a congregation; they are often a source of self-enhancement, and they contribute to group identity. .

Strict materialism does not answer such questions. Religions have answers to big questions.

D'Holbach said, "Men are naturally disposed to listen to and believe those who make them hope for an end to miseries." **Eric Weiner**, The one truly serious philosophical question is, "Should I get out of bed?"

How we think **Psychology, Fundamentalism and brain damage:** **Jordan Grafman**, a neuropsychologist at Northwestern U. found a coorelation between brain damage to the neocortex and fundamentalist religious beliefs, based on the fact that the neocortex is related to cognitive *flexibility* and

2018 religious fundamentalism is a rigid set of beliefs, not susceptible to nuance or change.

21 Lessons for the 21st Century **Philosophy:** **Yuval Noah Harari** (ref 1484, 1532, 1933, 2014-15), wrote *21 Lessons for the 21th Century*. It is not encouraging. Some chapters: Work, When you grow up, you might not have a job. Liberty, Big Data is watching you. Equality, Those who own the data own the future War. Never underestimate human stupidity Ignorance. You know less than you think Humility. You are not the center of the universe. Post-Truth. Some fake news lasts forever. Immigration. Some cultures might be better than others. (More pp. 394, 398, 402, 420, 440)

2019 **Psychology:** **Hans J Eysenck**, a Brit, once the third most cited psychologist in the world, was

- Fraud** exposed as a lifelong fraud. To date, 14 of his papers have been retracted, 26 of his writings declared “unsafe”, and 71 “expressions of concern” on his papers dating back to 1946)
- Biology: **Nathan Lents**, in *Human Errors, a Paronama of our Glitches, From Pointless Bones to Broken Genes*, “Human anatomy is a clumsy hodgepodge of adaptations and maladaptions”
- 2020 **Inequality can be reduced** Capitalism, Inequality: **Thomas Piketty’s** *Capital and Ideology*, (ref. 2013) says that inequality of wealth / power is not natural and can be reduced through sociopolitical mobilization like power sharing and a progressive income tax. [As of 2019, the richest 1% of Americans owned more than the bottom 50% of the nation’s wealth.] **Paul Krugman** said that **Piketty** argues that rising inequality is at root a political phenomenon, the social-democratic framework that made Western societies relatively equal for a couple of generations after WW 2 was dismantled, not out of necessity, but because of the rise of a “neo-proprietarian” ideology.
- Ongoing sufferings with a religious basis** Male superiority, fear of women’s equality: In Muslim countries, male superiority, ordered by Allah, pervades every aspect of life. In Pakistan, a woman can be sentenced to be death by tribal and Muslim courts if even a rumor of her “immodesty” brings “shame” upon her menfolk. Islam insecurity: A Muslim mob lynched **Priyantha Kumara**, a factory manager, saying he insulted Allah. In Israel, Orthodox Jewish “modesty police” terrorize women who talk to men in public, force women to sit in the back of busses, invade their houses, stone “immodest” women; spray acid in young girls’s faces. .
- Suicide bombers** Islam: Suicide bombers are almost exclusively Muslim. Those who *send* suicide bombers to their deaths of course live. They don’t believe in **Mohammed’s** paradise. They like their earthly power. Muslim virgins sentenced to execution are raped before their execution as the *Qur’an* forbids executing virgins. ISIS / ISIL, Hamas, Boko Haram and Al Qaida are Muslim inspired murderers organizations.
- Ongoing sufferings with a religious basis** America, Christians calling themselves the Army of God murder doctors who perform abortions. Two Christian religions prohibit use of medicine; so innocent babies die from diseases that proven medicines have cured. Mormon fundamentalists use the threat of Hell to coerce young girls to have sex. They practice, child-sex slavery, claiming to be acting for the Christian God
In Hinduism, child brides are flogged and sometimes burned alive when their dowry is considered too small. Widows were expected to immolate themselves when their husband dies.
Inter and intra-religions’ strife. After Indian independence Muslims and Hindus fought. One million died. Saudi Arabia did not “officially” abolish slavery until 1962.
- Philosophy: **Abhijit Naskar**, Indian, neuroscientist and philosopher. “The human has not one but two births – first, when a person is born from the mother’s womb, and **second**, when that person rises from the socio-culturally imposed cocoon of prejudices and ignorance.”. .
Mysticism and supernaturalism are the descendants of ignorance and fear.”. .
- Radicals have not hijacked Islam** Iran’s Muslim morality police murdered 22 year old **Masha Amini** for not properly wearing her hijab. Muslims reject the core beliefs of all other religions. **Sam Harris**: “Radicals have not hijacked Islam. We are at war with precisely the actions that **Mohammed** prescribed for all Muslims in the *Qur’an* and . . .*Hadith*.” **Erich Fromm**: “There is perhaps no phenomenon which contains so much destructive feeling as “moral indignation” which permits envy or hate to be acted out under the guise of virtue.”
- 2023 Philosophy: **A C Grayling’s** (ref 1689) book, *Philosophy and Life*, poses what a fellow philosopher says is the most important question you will ever ask yourself, “How shall I live my life?” It is known as the “*Socratic Question*.” For **Grayling** the two tasks of philosophy are make sense of things and to advance the good, This is done by *critical thinking and choosing*. He takes from Greek, mainly **Epicurus**, and other thinkers. **Epicurus** said a the source of the fear of death was understanding there was no afterlife. **Grayling** said of believers, “once you’ve accepted a belief . . . then almost anything follows.” He said he respects someone who helps others out of empathy more than one who helps out of a religious belief.
- 2020 “**Putnam’s** nervous system model presaged by decades stuff that’s very cutting edge in neuroscience,” **Phillips Jones**, a physicist who worked alongside **Putnam** in the early 1960s, said, “We got the sense that what **Einstein’s** general theory was for physics, **Putnam’s** model would be for the mind.”
- 2023 The Vatican repudiated the pope’s 1452 “*Doctrine of Discovery*” which had blessed European colonialism.

Conclusions: Fear of Knowledge Obstacles to Thinking Arguments for God

In all of history, persons in power have feared knowledge in the lower classes.

Fear of Knowledge: Through history, persons in power have feared the lower classes having knowledge.

Shih Huang Ti, China's first emperor, had all books but those on law, herbal medicine, and farming burnt. The Catholic Church made owning or even discussing writings of hundreds of authors a sin. Only priests had *Bibles*. **Umar ibn al-Khattab**, the second *caliph* said, "Burn the libraries, for their value is in the *Qur'an*." **Martin Luther** was vitriolic against "reason."

Napoleon said if he allowed freedom of the press he would not last three days.

The ruling white class in the US South feared educated Blacks, so they *outlawed* teaching Blacks to read or write and even poor illiterate whites to tax themselves for public schools.

Hitler, to discredit critical newspapers, called them the "lying press / die *Lugenpresse*."

(**Trump** calls critical news stories "fake news".) Some Muslim sects prohibit girls going to school.

Is there a purpose or meaning to human life? Priests tell us why we are here.

From the beginnings of recorded history some humans have wondered if there why they were here.

If there is some innate purpose for human life, it is not universally known as there are a multitude of theories held by theologians and philosophers. But perhaps the natural world answers this question.

We are a creature of nature. We are what we are as a result of natural selection. That is, random genetic mutations over eons. We evolved into our current self through eons of random purposeless genetic mutations and experiences. So, Brother Juniper, we *are* accidental, like all living matter. And like all creatures, we have a survival instinct. Accidently, we can think better than lesser creatures. Can random genetic mutations (like our brains) give us a purpose in life? Random genetic mutations have given us different experiences, different abilities, different interests, which have given us different purposes.

Scientists ask "How are we here?"

Christian clergy tell us that man's purpose in life is to be saved from the Christian Hell.

The *Qur'an* tells us Allah said, "I did not create. . . mankind except to worship me."

Chris Hedges, a believer, says, "God is the name we give to our belief that life has meaning."

Search for one's life's meaning

Viktor Frankl (1905-'97) Vienna, psychiatrist and philosopher, founded *logotherapy*, a school of psychotherapy that said that a search for one's life's meaning is the central human motivational force; that humans' goal is to figure out how to live in a way that gives purpose and meaning to existence.

Frankl's view is the third most notable school of Viennese psychotherapy, after **Freud & Alfred Adler**. (ref. 1900) He differed from **Freud** in that he did not make his patients study the feeling of inferiority.

Is there a meaning for human life?

The sense of self has evolved over eons and distances, so there are a wide range of aspirations that give humans a meaning for their lives. Human aspirations range from the noble to the trivial.

What gives a meaning to our lives?

Some common aspirations are: To excel at something, to be somebody, to help others, to gain power or fame or money, to avoid pain, to have pleasure, to understand the laws of nature, to revere a nation, a community, or one's family, to write a great book, to promote a cause, to be a respected scholar, wine expert, show dog trainer, athlete, proficient at some skill, or even to be a fan of a sports team. People in power, secular or ecclesiastic, are usually concerned primarily with staying in power. (**Mel Brooks**, philosopher, said, "It's good to be king.") Some are motivated principally by social status, which can outweigh nationalism.

Schuman: (ref. 1532, 1750) "Nationalism fulfills one great task—giving meaning to Man's life and justifies his passions before himself and history.

Sigmund Freud: (ref. 1900-39) described the power of our subconscious and unconscious mind. He said "What is the purpose of life?" has been asked many times. It has never received a satisfactory answer." But, different cultures have different purposes. There are a multitude of purposes of millions of people. Many people have multi purposes.

Johann Goethe opined, "Everybody wants to be somebody." [When one criticizes another's aspirations, that strikes at the heart of the other's self-esteem.]

What gives a life meaning?

Joseph Campbell, "Life is without meaning. You bring meaning to it. Being alive is the meaning." This resonates with some, but billions of people who know little of the world and who live in abject poverty on the brink of starvation, their "meaning" is to struggle to keep going, to find a scrap of

food or shelter, day after day, from dawn to dusk, month after month, year after year, until they die.

Untold millions have died to honor some god

Some purposes cause suffering of innocent people. Belief in an ideology or religion provides a purpose in life. Albigensians, Armenians, Amerindians, Anabaptists, accused witches, atheists, Aztecs, Baha'is, Buddhists Cathars, Catholics, Gypsies, Huguenots, Hindus, Incas, Jews, Jehovah's Witnesses,, Lutherans, Mormons, Muslims, Nicene Christians, Orthodox Christians, Pagans, Palestinians, Philistines, Puritans, Protestants, Quakers, Rastafarians, Zoroastrians, all have killed or been killed in order to honor some god.

Voltaire, "Anyone who can make you believe nonsense can make you commit atrocities."

"There is scarce a city or borough in Europe where blood has not been spilt for religious quarrels, including women and girls. Europe would have a third more people but for theological disputes."

Jacob Bronowski (ref. p. 1, 200K BC, 1927, '72), "The most powerful drive in the ascent of man is his pleasure in his own skill. Having a purpose of any sort is healthy." (More **Bronowski** p. 439).

How and what do we think?

How do we come to a purpose? **David Hume**: Custom is the great guide of human life. Reason is and ought only to be a slave to our passions. Reason only teaches us *how* to get what we want, but *what* we want is based on our emotions, passions, love, envy, anger, fear, pride. Men have never acted from reason. Man tends to accept the opinions of others."

Blaise Pascal, Custom is the source of our strongest and most believed proofs. It persuades the mind without thinking about the matter. It is custom that makes men Christians. [or Hindus, Buddhists, or Jews]

Can humans reason?

Reason: The secular community likes to think that humans can reason to proper conclusions. This is not easy; myriad factors cloud our thinking. Historically, the most powerful forces that hinder the advance of clear thinking have been persons representing a supernatural entity who believe simple knowledge is a threat to their positions. Most often they were believers of an ideology that claims its authority from a divinity. Whenever one accepts any religion or ideology or belief system, he has given part of his cognitive ability to someone else.

How we think

Many circumstances hinder clear thinking:

Obstacles to clear thinking

Dostoevski: "Man has such a predilection for systems and abstract deductions that he is ready to distort the truth intentionally; he is ready to deny the evidence of his senses only to justify his logic."

(This is cognitive dissonance. see 1955.) **Dostoevski's** *Grand Inquisitor* (1880) asked **Jesus**, "Did you forget that a tranquil mind is dearer to Man than a free choice in the knowledge of good and evil?"

Guy de Maupassant, We see things only with the memory of what our ancestors thought about what we see.

Shanto Lyengar & Sean Westwood: Political / ideological prejudice is stronger than racial or gender prejudice.

Schopenhauer: "Men don't think, only believe." So we "think" in slogans, aphorisms, proverbs.

Analogies

Hofstadter and Sander: (ref. 2012) We think in analogies, & analogies work only if matters are similar.

Saving lies

Henrik Ibsen: We begin to believe those lies we tell ourselves about ourselves to raise our self-esteem.

Michel de Montaigne: (1580), "Nothing is so firmly believed as that which is least known."

One thinks what one's been taught to think.

William E H Lecky, (1865), Brit, historian, "No mind was ever altogether free from distorting influences. The great majority even of those who reason much about their opinions have arrived at their conclusions by a process quite distinct from reasoning. They judge all questions by a mental standard derived from education. The number of persons who have a rational basis for their belief is probably infinitesimal." In the overwhelming majority of cases men simply acquiesce in the opinions they have been taught."

Murray Gell-Mann: (1929-2019), "Rationality is only one of many factors governing human behavior."

Most people would sooner die than think.

Bertrand Russell: "Science has forced its way step by step against Christianity, against the churches and against the opposition of the old precepts. Most people would sooner die than think. In fact, they do so."

Benjamin Franklin's lightning rod was condemned by clergy in England and America as an impious attempt to defeat the will of God, as all right thinking people knew lightning is sent by God to punish impiety."

H G Wells: There was a great struggle to establish [science] against those who say the *Bible* is the literal truth.

Jefferson: When [one] forms a theory, his imagination sees only the traits that favor that theory in every object.

Cognitive biases **Michael Marmot**, Brit, scientist: Scientific findings do not fall on blank minds that get made up as a result. Science engages with busy minds that have strong views about how things are and ought to be.

Availability bias; the tendency to overvalue evidence that comes easily to mind, often due to a recent event.

My-side bias: One tends see things in a way that favors one's "team": country, political party, sex, race, etc

Obstacles to clear thinking Emotions cloud clear thinking. Fear, anger, infatuation, egotism, narcissism, helplessness. Some myths, like male superiority are so ancient and so ingrained in our consciousness that they are not recognized as myths. Male superiority, for example, is enshrined in the *Bible* and the *Qur'an*. It has halved the brain pool from day one. Its manifestations are without number.

Obstacles to clear thinking **Walter Lippmann**, (ref. 399 BC, 1938) "The democratic El Dorado is impossible in modern mass society, whose members by and large are incapable of lucid thought or clear perception, driven by herd instincts and mere prejudice."
Where all men think alike, no one thinks very much.
What each man does is based not on direct and certain knowledge, but on pictures made by himself or given to him. If his atlas tells him that the world is flat, he will not sail near what he thinks is the edge. . .
If a man digs up what he thinks is gold, he will act as if he found gold.
Each of us lives and moves in a small circle.
Our opinions are based on what others have gathered and what we can imagine..

Ideologies (like religions and philosophies) are meant to influence one's thinking. And they do.
Any ugly prejudice like racism deeply ingrained in one's mind distorts one's thinking.

For stories like religions & ideologies you don't need truth to control people. **Yuval Noah Harari** (ref. 1484, 1532, 1933, 2014-5, '18), "*Scientific truths* are based on facts, experiments, mathematical truths, measurements. The *other kind of truth*, or the *other kind of stories*, are the stories that enable you to control humans. . . They are the basis for society. Things like religions and ideologies and so forth. And here you don't need the truth for power.
Power is based on making a lot of people believe the same story. It may not be true.
It's not true that if a story is false, that it will not be effective. No way!
You can have enormous social power by making a lot of people believe in fiction."

Obstacles to clear thinking **Plato**, Most people are comfortable in their ignorance, & hostile towards anyone who attempts to point it out.
Roger Bacon named four "stumbling blocks" to clear thinking, 1. Weak and unworthy authority, 2. Feeling of the uninstructed crowd, 3. Custom, & 4. Hiding of one's ignorance in a display of apparent knowledge.

Thomas Hobbes, When power is at stake, one's desire for dominion distorts reasoning, even on trivialities.

Obstacles to clear thinking **Francis Bacon** named four types of idolatry that lead men's thinking astray, 1. *Idols of the tribe*, like the tendency to oversimplify, 2. *Idols of the mind*, loose language of any sort, 3. *Idols of the marketplace*, the tyranny of words, and 4. *Idols of the theater*, prejudices from received philosophical or religious systems.

Authoritarian science **Loren Eiseley**, (1859), "To those who have substituted authoritarian science for authoritarian religion, individual thought is worthless, unless it is the symbol for a reality which can be seen, tasted, felt, or thought about by everyone else. Such men adhere to a dogma as rigidly as men of fanatical religiosity."

Dietrich Bonhoeffer, German, Anti-Nazi, Stupidity is "a more dangerous enemy of the good than malice."

Propaganda **Edward Bernays**, father of modern public relations, moulder of public opinion, advised, "Don't use facts or logic. Keep it simple, Create a mood. Repeat, repeat your message. Concentrate on the uneducated.."

Repeat, repeat, just a few ideas. We have previously noted how **Hitler** and **Mussolini** used **Bernays's** methods and played to ignorant peoples' prejudices and caused masses of people to believe and act on their lies.
Hitler's manifesto *Mein Kampf* (1925) described who and how to control people, including.
"The primitive simplicity of the *volk* renders them more easily prey to a big lie than a small one."

Repeatedly denigrate The diaries of **Joseph Goebbels**, **Hitler's** Propaganda Minister, similarly describe how **Hitler**

- your critics.** controlled the German folk. "Avoid abstract ideas; appeal to the emotions. Constantly repeat just a few ideas. Give only one side of the argument. Continuously denigrate your opponents."
- Repetition** **Bernays's** PR techniques of are no secret and used by demagogues and salesmen everywhere.
Donald Trump: (July 5, 2021), "If you say it enough and keep saying it, they'll start to believe you."
 CNN commented, "**Donald Trump** accidentally told the truth about his disinformation strategy."
- Robert Sapolsky:** American, "Unconscious forces cause voters to vote for . . . better *looking* candidates."
- Emotion** **Alfred North Whitehead:** philosopher, mathematician, "Ninety percent of our lives is governed by emotion. Our brains merely register and act upon what is telegraphed to them by our bodily experience."
- Feelings** **Herbert Spencer:** "Opinion is ultimately determined by the feelings, and not by the intellect."
- Obstacles to clear thinking** **James E Alcock:** (ref. 2018) "We do not choose our beliefs; they are generated and maintained through automatic processes in our brain."
William Hazlitt, "We are all of us more or less the slaves of opinion."
Leonardo da Vinci: "Whoever in discussion cites authority uses not intellect but memory."
- Twelve obstacles to clear thinking** **Michael Shermer,** His book, *The Believing Brain* noted a dozen obstacles to clear thinking:
 1. Theory influences observations. 2. The observer changes the observed. 3. The equipment we use to observe (like a telescope) constructs the results. 4. Anecdotes do not make a science. 5. Scientific language does not make a science. e.g., *Creation Science* is not science. 6. Bold statements do not make a claim true. 7. Heresy does not equal correctness. 8. Rumors do not equal reality. 9. Unexplained is not inexplicable. 10. Correlation does not mean causation. 11. Coincidences are just that. 12. Emotive words and false analogies prove nothing."
 "The brain finds patterns to phenomena and then infuses the meanings that shape its understanding of reality, belief-dependent reality, ignoring contrary evidence."
- Obstacles to clear thinking** **Edward O Wilson:** "Man and his works are the products of deep patterns of behavior genetically wired."
Nathan Lents (ref. 2019): 1. "The human brain can't comprehend large numbers; 2. we are easily fooled by optical illusions; 3. frequently our memories are wrong. 4. We are confused, distracted, tricked, and subject to cognitive bias."
- Cognitive biases** **J Anderson Thomson** and **Clare Aukfor** (ref. 2011) described how certain physical characteristics of the brain predispose people to believe in supernatural beings despite centuries of such forces being debunked.
- Obstacles to clear thinking** **John McKay:** Every word we use carries within it the experience of generation after generation of men, women, families, tribes, and nations, often including their insights, value judgments, ignorance, and spiritual beliefs. Crowds of silent voices whisper in our ears, transforming the nature of what we see and hear.
Thomas Merton: We see reality through our subconscious memory of previous experience.
Leon Festinger: We hold to our beliefs, even dishonestly, against contra evidence.
- Obstacles to clear thinking** **Amos Tversky:** "Metaphors are vivid and memorable, not readily subjected to critical analysis. They can impact human judgment even when inappropriate or misleading.
 He and **Daniel Kahneman's** (ref. 1973, '75) basic big idea "Our minds rely on unconscious rules of thumb, heuristics, which cause us to make quick judgments which may be in error. People sold on a theory fit new facts to that theory. Historians fit facts to their theory of history."
 Also, Most people are overly influenced by surveys based on too small samples.
Frank Herbert: "The truth always carries the ambiguity of the words used to express it."
- Obstacles to clear thinking** **Mark Twain:** "When the brightest mind in our world has been trained up from childhood in a superstition of any kind, it will never be possible for that mind, in its maturity, to examine sincerely, dispassionately, and conscientiously any evidence or any circumstance which shall seem to cast a doubt upon the validity of that superstition. I doubt if I could."
- Ignorance** **Al-Afghani** criticized Muslim scholars who read old texts but don't understand electricity or a steam engine. How can these people call themselves sages? The imam is like an

ox yoked to a dogma that stifles science.

Communists, when ruling Russia, demanded that all science conform to communist ideology.

Cognitive biases **Upton Sinclair:** "It's difficult to get a man to understand something, when his salary depends on him not understanding it."

Peter Drucker: "As a rule, we perceive what we expect to perceive."

H L Mencken: "Religions' modest services on the ethical side are nothing to their damage to clear thinking."

Paradigms **Thomas Kuhn:** Scientists usually operate and think in *paradigms*, the accepted set of beliefs of their field.

James Thurber: Sixty minutes of thinking of any kind is bound to lead to confusion and unhappiness.

Confirmation bias: the tendency to search for, interpret, favor, and recall information that favors one's beliefs.

Cicero: "There is nothing so ridiculous but some philosopher has said it." "To think is to live."

Obstacles to clear thinking **Lord Acton,** (1887) "The bonds of class are greater than those of nationality," and "There is no error so monstrous that it fails to find defenders among the ablest men."

Similarly, **Jonathan Swift:** "The various opinions of philosophers have scattered through the world as many plagues of the mind as Pandora's box did those of the body."

Joseph Campbell, *The Power of Myth:* People tend to conform their thinking to the prevailing public opinion.

Lev Vygotsky: (ref 1958), Russian. "We think based on concepts and words we know."

(A child who is unaware of the *concept* of boredom will never be bored.)

He founded cultural-historical psychology. Thought is restructured while it is transformed into speech.

Language **Ed Sapir:** One's language affects one's thinking. We understand the world only through words we know.

Cognitive biases **Robertson Davies:** Canadian, "The eye sees only what the mind is prepared to comprehend. . . Boredom, stupidity, patriotism, especially when combined, are three of the greatest evils of the world we live in."

Sharon Salzberg: (1952-), (A mediation pioneer) Evolutionary biologists say that we have a "negativity bias" that makes our brains remember negative events more strongly than positive ones.

Gordon Hudson: Brock Univ., Ontario: Low intelligence children tend to gravitate to socially conservative ideologies, which stress hierarchy and resistance to change, attitudes that can contribute to prejudice.

Earlier studies found a correlation between low levels of education and higher levels of prejudice.

Obstacles to clear thinking **Brian Nosek,** Cognitive psychologist, UVA: "Prejudice is more common in those who hold right-wing ideals than those of other political persuasions. People of low cognitive ability had less contact with people of other races which tends to be mentally challenging and cognitively draining."

Cultural biases **Stephen Jay Gould:** Facts are not unsullied bits of information. Culture influences what we see and how we see it. "We, largely, are playing against ourselves. Nature is objective, and nature is knowable, but we only view her through a glass darkly (*Corinthians 12:13*), and many clouds upon our vision are of own making: social and cultural biases, psychological preferences, and mental limitations."

W V O Quine: We can't compute complex truths out of simple elements based in direct sensation, as all simple sensations are defined by the ontology of a specific language. There are many languages each with its own way of seeing reality. The language we use depends on our purpose. All raw data are theory-laden.

Aaron Kay: "Humans are psychologically motivated to want control, order, and certainty in their world, choosing from a limited menu of conceptual defense mechanisms, such as religions or institutions that impose strict social control."

Demosthenes: (348 BC), "We believe whatever we want to believe."

Stupidity **Andre Trocme,** (1901-71), French Protestant pastor, wartime savior of Jews and children, "Stupidity is a prime mover in human affairs."

Robert Mitchum: "Kid, life's hard. But it's a lot harder if you're stupid."

Eric Hoffer: Much of man's thinking is propaganda for his appetites. We lie the most when we lie to ourselves.

Voltaire: "It is hard to free fools from chains they revere."

Henri Amiel: “Action and faith enslave thought, both of them not to be inconvenienced or troubled by reflection, criticism, or doubt.”

Author: People who *wish* to be *offended* will find something that *offends* them. People who believe in miracles (or UFOs or conspiracies) will *find* miracles (or UFOs or conspiracies).

Ernest Renan, “Miracles were only reported where people were disposed to believe in them.”

Obstacles to clear thinking Psychologists **Helen Pluckrose** and **James Lindsay**, in their book *Cynical Theories*, say that if one is obsessed with detecting patterns of oppression, he will eventually find them in nearly all relationships. One armed with critical theories will tirelessly focus on injustices - real or imagined. . .”

Daniel Goleman, science journalist and professor, wrote *Emotional Intelligence: Why It Can Matter More Than IQ*, “In a very real sense we have two minds, one that thinks and one that feels.” (2005)

Logical fallacies replace emotion for logic and impair clear thinking. (65 are described on p. 443)

The **Templeton** Effect, Scholarly research results tend to agree with the views of who pays the scholar.

Clarence Darrow: “I know the weakness of human reason, but it is all we have. The only safety of Man is to cultivate it, extend his knowledge so that he will be able to extend life and understand as many of life’s mysteries as he can.”

Wikipedia cognitive biases. *Wikipedia* lists about 200 “cognitive biases,” i.e., “systematic patterns of deviation from rational thinking,” 109 are *Belief* and *behavioral biases*, 28 are *Social biases*, 50 are *Memory errors* *biases*, and 16 are *common theoretical causes of such cognitive biases*. While some named biases are close or redundant and some are trivial, it’s still a daunting list.

Thoughts regarding thinking **Henry Ford:** Thinking is probably the hardest work there is, which is probably why so few do it. **Eugene Ionesco:** It isn’t what people think that is important, but why they think what they think.

Ralph Waldo Emerson, “What is the hardest task in the world? To think . . . Intellect annuls fate. So far as a man thinks, he is free.” “Science surpasses the old miracles of mythology” and “corrects the old creeds, sweeps away . . . our infantile catechisms, and necessitates a faith commensurate with grander orbits and universal laws which it discloses.”

H G Bohn: “Thinking is very far from knowing.”

Demagogues play on peoples prejudices Psychology, demagogues: A study at Johns Hopkins University “*Activating Animus: The Uniquely Social Roots of Trump Support*” concluded that **Donald Trump** did not create hatred of marginal groups. He appealed to those who already were prejudiced, mostly less educated persons, by giving them someone to hate and blame and to feel superior to.

White Supremacy: Many US politicians have appealed to white supremacy. **George Wallace**, a Southern politician lost his first election in Alabama to a man who was more racist than he was. He said, “Nobody is going to out-nigger me again.” He had no organization, but his racism appealed to many racists, not only in the South. In the 1960s, the “Southern Strategy” was a **Richard Nixon** strategy to increase political support among white voters in the South by appealing to racism against Negroes. It worked.

Trump awakened a sense of white nationalism (i.e., racism) **Richard Spencer**, American neo-Nazi, anti-Semitic, activist for white supremacists, explained **Donald Trump’s** appeal, “What’s most important about **Trump** is the emotion. He’s awakened a sense of “us,” a sense of nationalism about white people. . . . He’s done more to awaken that nationalism than anyone in my lifetime. I love the man.” **Spencer** also used **Hitler’s** phrase *Lügenpresse* / *lying press*.

Philosophers and scientists err. Philosophers and scientists err and differ. The history of philosophy is a continual procession of new philosophies. **Locke** said that the mind at birth is a blank slate. **Kant** disagreed. He said that the mind at birth has built-in abilities that enable it to understand, So, logically, *one* of these views *must* be wrong. *Both* in fact *may* be wrong. But the scientific enterprise follows logical and uniform laws of nature and discovers objective reality despite human limitations. To a scientist, unknowns are not mysteries but simply as yet unsolved issues.

Political Political Theory: Democracy is, in most basic terms, the rule of the people by majority vote.

Theories: In modern times it includes protecting certain rights of people (*U.S. Bill of Rights*) against the “tyranny of the majority.” With its faults, democracy is the form of government that best permits persons to choose their governors, that best respects individuals, and comes closest toward providing individual freedom.

John Dewey, “Democracy and the one ultimate ethical ideal of humanity are to my mind synonymous.”

Democracy **Will Durant** in 1968, “Democracy has done less harm than any other form of government, allowing science and enterprise to grow, regardless of class. But, If our economy of freedom fails to distribute wealth as well as it has created it, the road to dictatorship will be open to any man who can persuasively promise security to all.” (See. 2013, 2020-**Piketty**) .

Democracy is such a powerful concept that even authoritarians like Russian **Putin** and Chinese president **Xi Jinping** say their authoritarian regimes are actually a form of democracy (2022).

In all countries, the largest religions preach support for the ruling classes. Many countries, even secular European ones, subsidize religions, paying clergy, exempting them from taxes. Churches in turn preach obedience to those in control.

Medieval Theocratic rule was corrupt and incompetent Political Theory, theocracy: Medieval theocracy, the rule of God, prevailed in the *Dark* and *Middle Ages* in the West. Believing Christians were taught and lived under the unbearable threat of the fires of Hell for eternity. This was a very tough act to buck. Theocratic rule was corrupt (ref: some popes, **Erasmus, Wycliffe, Hus, Luther, Peter Damien**). Christian theocracy weakened as science debunked supernatural explanations for phenomena. The basic weakness of any religion as a social control is that it loses credibility when its statements are shown false. Science provided natural, verifiable, predictable, explanations for events once attributed to gods. The authority of gods has now shrunk greatly.

Theocracy is inconsistent with reason and science. Theocracy, the religion is the government: Some *Islamic* countries are theocracies where religious thinking dominates the government. Theocracies consider any opposing *political* thinking to be *religious* dissent, against their God. So they cripple themselves intellectually. In contrast, democracies *protect* independent *political*, philosophical, and *religious* thinking. **Neil deGrasse Tyson:** “Theocracies are incompatible with reason and scientific advancement
“I don’t want to know why 85% of the members of the National Academy of Sciences reject God. I want to know why 15% of the Academy don’t.”

What can we know? What *can* we know of the world? We *can* know a great deal about the natural world, and many do. We *can* know *something* of the human mind. We will probably learn the secrets of the universe before we understand the human mind. What *do* most of us know? Not much. See p. 420.

What can we know of the world? All knowledge of the world begins with basic truths that are true by definition, like mathematical calculations and facts verified by experiments, from which logical arguments and experiments lead to a consistent and expanding body of natural laws that all participants agree on and that govern and therefore can predict *how* things happen. New theories and new explanations are tested by the *scientific method* and are verified or discarded. In the period of around 2,000 years, Humans have progressed from knowing virtually nothing of the world to mastering electricity, satellite TV, space exploration, relativity, antibiotics, and quantum electrodynamics.

Science: **Thomas Paine**, “Man cannot make [scientific] principles, he can only discover them.”

Richard Dawkins, in *Science in the Soul*, “The laws of nature are waiting to be discovered by the individual human beings who discover them. If two different people independently discover some truth in science, it will be the same truth. This is both a glory and a limitation of science. Unlike works of art, scientific truths do not change their nature in response to whomever has the ability to do so.”

Scientists learn how to grow better crops. The Supernatural: What *can* we *know* of the supernatural, matters beyond events that obey natural laws? We can *know* nothing, nada, zero. We can think we know. We can believe. Priests explain natural events consistent with their theology and position in society. **Yuval Noah Harari**, (ref. 1484, 1532, 1933, 2014-5, 2018, pp. 394, 398) “Scientists know how to cut corners and twist the evidence, but in the end, the mark of science is the willingness to admit failure and try a different tack. That’s why scientists learn how to grow better crops and make better medicines, whereas priests and their like learn only how to make better explanations of their scriptures.”

Priests learn how to better explain their

scriptures	"When things really work, everybody adopts them." Theology is mainly the search for believable arguments for God. In other words, special pleading. (Bertrand Russell) Different religions have different concepts of their god/God. Christian, Jewish, and Muslim scriptures define their God. Their Gods have numerous attributes including omniscience, benevolence, omnipotence.
The world is how God wants it.	Believers in an Abrahamic (Christian, Jewish, Muslim) God must logically believe that the world now is just how God wants it. That is, If there is an omnipotent, omniscient, benevolent God, He knew <i>everything</i> that was going to happen in the world when He created it. So he has knowingly permitted all unnecessary or pointless sufferings from the beginning of time. Believers then believe that the universe evolved as God knew it would. Hume named four things that a perfect God could have easily done to make a better world. (see 1779)
Can God be proven?	In the West, one common belief is that the existence of God <i>cannot</i> be proven to exist or <i>not to exist</i>. But, depending on how "God" is defined, it <i>can be</i> proven. A pantheist's God is easily proven, God is nature. Pete Seeger said, "I'm not an atheist because I think God is everything. Whenever I open my eyes I'm looking at God." On the other hand, Gods (or any proposed object) with characteristics internally contradictory or contrary to nature (like a flying elephant, or a five-sided triangle, or an impotent god) can not exist.
That God exists must be proven	Carneades: (ref.150 BC), head of Plato's Academy and a Sophist, said, "The existence of God is not self-evident and therefore needs proof." For believers, their religions' scriptures are proof of their God. Muslims have their <i>Qur'an</i> and <i>Hadith</i>. Mormons have their <i>Book of Mormon</i>. Christians and Jews have their <i>Bibles</i>, and so forth.
Arguments for God	Believers in an Abrahamic God throughout history have posited arguments for their God's existence. Many such arguments assume a God. Some arguments for God are <i>natural theology</i> arguments. Namely, that there are observed natural facts in the world that <i>infer</i> the existence of God. Some of those arguments are arguments from ignorance, i.e., we don't <i>know</i> what caused X, so we <i>infer</i> that some God <i>must</i> have done it. Notwithstanding Pope John Paul 2's abandonment of rational arguments for God in 1988, believers continue to use and devise such arguments.
God must have designed the universe, as all things act toward an end.	<u>The Argument from Design / Teleological (purpose) argument</u> is considered to have originated around 450 BC with Anaxagoras. "We see that things which lack intelligence, such as natural bodies, act for an end, and this is evident from their acting always, or nearly always, in the same way, so as to obtain the best result. Therefore some extremely intelligent supernatural being must exist that directs all natural things to their ends; and this being we call God." Similarly, the excellent design of the world shows that it must have been <i>designed</i> by such a God (presumably their particular God.).
Darwin: All life on Earth evolved by Natural Selection.	Aristotle said that <i>purpose</i> was the prime mover in nature. Billy Graham, a famous evangelist, agreed. "The world is so complex and so well designed that it couldn't possibly have happened by chance." Contra: <i>Darwinism</i> says that life on Earth <i>did</i> happen by chance, i.e., by <i>random</i> genetic mutations of <i>Natural Selection</i> over eons. Hume in 1779 and Russell in 1927 gave several refutations of the <i>Design Argument</i>. The contra <i>Problem of Poor Design</i> says the <i>poor</i> design of the world negates God.
Arguments for God	<i>Argument from Intelligent Design</i> is a simple rewrite of the <i>Design Argument</i>, a <i>made up</i> argument to get around a Supreme Court decision that said state agencies (public schools) may not promote religion. It says that an "intelligent designer" designed the universe, but does not <i>explicitly</i> say that the designer was God. The "designer" of course <i>implicitly</i> was God.
Intelligent Design	Some literature on <i>ID</i> was created partly by a word processor simply by replacing "Intelligent Designer" for the word "God" or "creator" in texts positing the <i>Design Argument</i>. It convinced some believers on school boards to try to use it. The judge, John Jones, in 2005 Jones remarked that "The breathtaking inanity of the [School] Board's decision" to support <i>Intelligent Design</i> was evident.
God made the universe for humans (Deism?)	<i>Anthropic Argument/Argument from Fine Tuning</i>: All the laws of physics, chemistry, biology, etc, had to be designed so to produce humans, as humans are most improbable cosmologically. This is akin to Deism. That is, a supernatural God fine tuned all the natural laws to produce humans. Contra: Natural selection shows that all living things evolved to adapt to the universe, not the universe to produce living things. See 1973 for a fuller discussion of "fine tuning" and its defects.)

Many great men believe Christianity is true, so it must be.

Argument from Popularity: **Samuel Johnson** said, "As to the Christian religion, we have a balance in its favor from the number of great men who have been convinced of its truth after a serious consideration of it. Similarly, Anglican bishop of Durham **Nicholas Wright** (1948-) said, "No explanation of the success of Christianity is possible that does not rest on its being true."

Contra: This is the logical fallacy of "appeal to popularity." 1.7 billion believe in Allah. Another billion are atheistic. It is also flawed factually as conquerors usually determine their subjects's religion.

Intelligibility of human experience

Presuppositional Argument. **Cornelius Van Til**. Presuppositionalists got their name as their central tenet is that a Christian must at all times presuppose the supernatural revelation of the *Bible* as the ultimate arbiter of truth and error in order to know anything. **Van Til** said that the existence of God cannot be proven by an appeal to raw facts, but God's existence can be proven by the very same belief (even the condition of unbelief) and is the necessary condition to human experience and action. In other words, human experience and action proves that God exists. (Ref. 1928)

Consciousness

Argument from Consciousness: **J P Moreland**: "Materialism can't explain how evolution changed the water of biological tissue into the wine of human consciousness. Only theism can explain it."

Contra: This infers that that at some point a god infused consciousness into humans (or their ancestors) which previously did not possess consciousness. Consciousness in humans is extensively discussed at 2000, p.383. The short answer is, it evolved, experience by experience, .

Gaps in the fossil record are unexplained phenomena

The God of the Gaps Argument: says that there are gaps in the fossil record, thus evolution is false, and there are unexplained phenomena in nature and science, thus we *infer* there must be a God. Contra: First, it's an argument from ignorance. Second, science closes scientific gaps in knowledge daily. It is of little help to a believer as it infers no particular religion or ideology.

Eternal Truths

Argument from Eternal Truths: certain statements are always true, eternal, and can only exist in the mind of a God, so God exists. (ref. 1710-**Leibniz**) But, natural laws can be known by humans.

Impulses of peoples' hearts

Jean Jacques Rousseau said that rational thoughts regarding God are uncertain, but the impulses of people's hearts are more valid than reason, and one's "impulses" show the truths of natural religion, namely, God exists. This argument is similar to the argument from miracles.

The universe needed a first cause

Cosmological Arguments: stemming from **Plato** and **Aristotle**, are a family of arguments, including the *Kalam Argument (Averroes)*, the *First-cause Argument* and *Contingency arguments*, (**Aquinas** 1279), all based on the premise that the universe must have at some time in the past been "caused" (a first cause), and, as we can not think of any natural first cause, the only possible first cause is beyond nature, supernatural, i.e., God, usually the God of the speaker. Contra:
1. Cosmological arguments do not *infer anything* other than that *something* began the universe.
2. This argument proposes a mystery (a God) to solve a mystery (man's current ignorance of a first cause).
3. Similar to 2. The argument is an argument from ignorance.
4. That the universe needed a cause is challenged by cosmologists.
5. **Russell**, Just because things in the universe are contingent doesn't mean the universe is contingent.
6. **Hume**: The premise of causality is based on a *posteriori* reasoning (knowledge based on experience or experiment or deducible from them). He argued that causal relations are not true *a priori* and that it is unwise to draw conclusions from an extrapolation of causality beyond experience.

Christological Arguments for God have three forms
1. Jesus was wise

Christological Arguments for God have three forms:

1. *Argument from the wisdom of Jesus:* **Jesus's** wisdom is unquestioned. He said that God exists. Therefore God exists. **Bertrand Russell**: "This simply reports a belief. Many of **Jesus's** reported views were not what would reasonably be considered in any way wise or God-like." **Matt. 5:17** says Jesus endorsed the cruel laws of the Old Testament, like those that justified genocide and slavery, killing sassy children, hating your parents to be a disciple, turning relatives against each other. His morality was based on rewards and punishments, rather than doing good as it's the right thing to do.

2. Jesus claimed to be God

2. *Argument from Jesus's claims to be God:* He was so holy he wouldn't lie. Therefore He is God. One version of this is **CS Lewis's** "*Liar, Lunatic, or Lord trilemma*." Namely, **Jesus** claimed to be God and only 2 possible alternatives to **Jesus** being *Lord* are *liar* and *lunatic*, both of which are refuted by his moral teachings. Thus **Jesus** is Lord/God. Contra: **John Beversluis** said that limiting possible answers omits logical alternatives like the possibility that **Jesus** was simply mistaken (without being

clinically crazy). Another omitted reasonable alternative is that **Jesus** didn't really claim to be God but that the scribes who actually wrote the *New Testament* wrote that **Jesus** was God in order to validate their religion. (Ref. 1983). In addition, whether he did so claim is factually unclear. Biblical scholar **Bart Ehrman** (2008), says there is a great deal of evidence for this position.

- 3. Jesus performed miracles** 3. *The Argument from Miracles*: **Jesus** performed miracles, so he is God. (St **Paul's Resurrection Argument**). Miracles are actions by a divine that violate natural law. One who performs a miracle therefore is, by definition, a god of some sort. The logic is sound and like all arguments is dependent on the strength of its premises. If **Jesus** was resurrected, he is a God or was resurrected by a God. So it is as probable or not as any violation of natural law. (**Da Vinci**, Nature doesn't break its own laws.)
- Aquinas's Five Proofs** **Aquinas** offered five positive arguments for God. Namely, *Proof from Motion*, *Proof from an Efficient Cause*, *Proof from Necessary vs. Possible Being*, *Proof from Goodness*, and *Proof from the Regularity of the World*. The first four are *Cosmological (first cause) Arguments*. The fifth is the *Design Argument*. (A fuller description of these arguments is at 1269-**Aquinas**, '73)
- Remedying Injustice** *Argument for Remedying Injustice*: Good people suffer, bad people prosper; so there *must* be a Heaven and a Hell and a God to do justice for everyone in the afterlife. Contra: This speculates on God's purpose and is an inferential argument from ignorance. That is, as we don't know, we *infer* a God. That bad people prosper could just as easily be explained by a Satan or by an incompetent or evil God.
- Contra-Aesthetic Argument** *Contra-Aesthetic Argument*: Atheism cannot adequately explain the appreciation of beauty in the diverse forms it is found, because that appreciation, by-in-large, has no evolutionary advantage. This might include beautiful things like music or art, natural beauty like landscapes or astronomical bodies, or the elegance of abstract ideas like natural laws or mathematics. And, only a God could create such beauty. So God exists. (This is a *Design Argument*.)
Contra: **Hume**: Beauty is not a quality in things themselves: it exists merely in the mind of a beholder which contemplates beauty, and each mind perceives beauty differently. (ref. 425 BC, 1273)
- "I saw God" is an argument from miracles** *Argument from Religious Experience*: I saw /felt/ and/or spoke with God, so He exists. The logic is sound. Like the argument from miracles, it depends entirely on whether the premise is true. It is as true as any miracle. **Joseph Hinman** argued that some religious experiences can be so life-transformative that there *must* be a God. If one believes in supernatural forces, one can accept this argument. Contra: **Hume**, Miracles don't occur. "What is more likely, that one spoke to God or that somehow one was mistaken?" (**Hume** ref. 1300 BC, 1637, 1748, '51, '79) .
- A God created the universe and left.** *Deism*: a religious *philosophy* positing that the common beliefs of all religions *infer* a creator God and certain moral standards, but nothing beyond that. So a God created the universe, set some moral rules and natural laws, and left the universe alone to evolve. (ref. 1624).
Contra: Moral standards vary greatly from culture to culture and from time to time. It is also an argument from ignorance. We don't know how the universe began so a God must have done it. A deist world runs precisely the same as a world with no God.
- Pre-established Harmony** *Argument from Pre-established Harmony*: There is no causation in the world but that each event arises when it does because God pre-programmed it when the universe began.
Also the perfect functioning of mind and body, is ordained by God. (Ref. 1710-**Leibniz**).
This is speculation and by any measure, the mind and body function far from perfectly.
- Descartes' Ontological Argument for God** **Descartes's Ontological Argument**: said that the existence of a benevolent God or deities is logically necessary for the evidence of the senses to be meaningful. God's existence is *inferred* from the fact that necessary existence contained in the clear and distinct idea of a supremely perfect being," i.e., God's existence, is self-evident as it is in his nature to exist . . .
As we are finite, the idea of an infinite being must have come from such infinite being. . . only God could have caused the idea of God to arise in our minds. Contra: religions vary, this means that God told all the different religions different ideas of himself. **Descartes's** argument is subject to the infirmities of the other ontological arguments. (Ref. 1637, 1644).
- Spinoza** also devised an *Ontological Argument*. (Ref. 1670) **St. Paul's Argument**, "Since creation God's eternal power and deity have been clearly perceived in the things that have been made. *Romans 1:20*.

Sensus divinitatus, an innate sense of a God	John Calvin said Man has have a <i>sensus divinitatus</i> , an innate sense of God's existence, given by God. Plantinga agreed but say it doesn't work for some as their reasoning has been damaged by sin. Plantinga co-founded <i>The Society of Christian Philosophers</i> . Christian theology is largely seeking evidence or arguments to support Christianity. Plantinga's ultimate response to the problem of evil is that it is not a problem that can be solved. Christians simply cannot claim to know the answer to the "Why?" of suffering and evil. Plantinga stresses that this is why he does not proffer a theodicy but only a defense of theistic belief as rational in the face of unanswered questions. Recall, Bertrand Russell said that seeking arguments to reach a predetermined conclusion was not philosophy; it was just special pleading.
Argument from Reason	<u>Argument from Reason</u> : C S Lewis : Naturalism "impugns the validity of reason and rational inference," and as such, naturalists contradict themselves if they use reason to defend their beliefs. On the most basic level, naturalism is a process of drawing logical inferences like that of physics without reference to purpose.
Morality	<u>Argument from morality</u> : Premise 1. Objective moral values exist (Objective morality means a system of ethics no matter if anyone likes it or dislikes it, like: Be fair to people.) People have such moral values. So a God is needed to have caused those moral values.
Arguments for God	C S Lewis, says all people know right from wrong, which could only come from God. Contra: Philosopher John Beversluis said that C S Lewis's statement is speculation ; and like <i>Deism</i> , that moral standards vary greatly around the world and from time to time.
Animals act morally without God	[Contra: Some moral values differ around the world and in different cultures, but there are some basic moral values essential to survival which do not vary. Beversluis : moral behavior by animals suggests morality without involving a god. He said Lewis only answered straw man arguments and not the strong refutations of God by Hume and Hobbes .
Humans desire joy	C S Lewis also argued humans have an innate desire for joy beyond the natural world. So there must be an object to satisfy that desire, thus God. Beversluis replied, No, lots of people are perfectly satisfied with their life, with their careers, their family, or some ideology. (ref.1947)
The Bible says so.	<u>Argument from Authority</u> : God exists because <i>The Bible (or Qur'an or Book of Mormon)</i> says so. Contra: This is a circular argument, a logical fallacy. (Ref. AD 200 and p. 443- fallacies))
Muslims	<u>Muslims</u> : The revelations in its <i>Qur'an</i> proves its divine authorship, and thus the existence of their Allah. Muslim Sufis: Those who follow a path towards guidance come to believe in Allah and the laws of Islam.
Mormons	<u>Mormons</u> say that the miraculous appearance of God, Jesus Christ , and angels to Joseph Smith and the finding and translation of the <i>Book of Mormon</i> proves the existence of the Mormon God.
Strangite Mormons	The Strangite sect of Mormonism says that the finding and translation of the plates of Laban into the <i>Book of the Law of the Lord</i> and Voree plates by James J Strang (a rival of Brigham Young in Illinois), establish the existence of their God.
Why do we need arguments for God? Why doesn't He just appear?	Hundreds (at least) of religious sects, some very large, have had their day and died, their gods forgotten. None of their beliefs have been verified as natural laws have. None have proved persuasive to even a bare majority of humans. The arguments for God described herein above are those that are currently cited. The large variety of arguments for God, and the problems of their dogmas raises obvious questions. "Why do we need <i>arguments</i> for God? Could not God just show up and resolve all questions? Would not a loving God want to end the suffering due solely to the wars between different dogmas?
Problems with belief in God.	There are answers to the God arguments (some have been mentioned above) as well as other problems with God's existence. One overall problem which has several sub-problems is the <i>Problem of God's Inaction</i> aka <i>The Problem of Divine Hiddenness</i> . It is basically "If a perfect loving God exists, why hasn't he done something God-like and worthy of worship that we could see.
Problem of God's Inaction,	Some problems with God's existence simply contrast the promises or characteristics of God in the <i>Bible</i> to the absence of evidence that God has fulfilled such promises or not acted as His characteristics would dictate. (See AD 414)
Problem of a Silent God	One subset argument to the problem of God's inaction is the <i>Problem of a Silent God</i> . Would not a loving God speak the same message to all persons clearly and consistently. He clearly hasn't.

Problem of Contrariety, Contradictory dogmas.

People are very gullible

Another aspect of God's inaction is the *Problem of Contradictory Dogmas* aka *Problem of Contrariety*, Namely, would not a powerful God *prevent* beliefs in his name that contradict each other and cause their believers to kill each other (the religious wars)? **Arthur C Clarke said**, "[It] is amazing how childishly gullible humans are. There are, for example, so many different religions – each of them claiming to have the truth, each saying that their truths are clearly superior to the truths of others - how can someone possibly take any of them seriously? I mean, that's insane." .
Mencken (ref.1925) asked, "Where are the graves of Resheph, Anath, Ashtoreth" (and 65 other gods he named) once highly esteemed and worshiped by millions of people, but now forgotten.

Too many gods for any one to be credible

Contrariety: **John Stuart Mill**, "If a God were truly responsible for religions being so widespread, wouldn't it make sense for those religions to have more in common?"

Red Jacket/ Sagowatha, Seneca Chief, "You have our country. You want to force your religion upon us. You say there is but one way to worship the Great Spirit. If there is but one way, why do you white people differ so much about it?"

Al-Razi (ref. 910), The variety of religions proves that they are man-made, and thus without meaning.

Recall **Swinburne**, *the Problem of Evil* "is the most powerful objection to traditional theism."

Moses Maimonides, the eminent 13th century Jewish scholar, said that the *Problem of Evil* is "the most difficult matter, which is at the root both of faith and of apostasy, with which scholars of all ages, people, and tongues have struggled." .

How the problem is misnamed.

"Evil" is irrelevant.

The literature on the *Problem* usually refers to it as the *Problem of Evil*. The "evil" in the context of the *Problem of Evil* is simply something that causes pointless or gratuitous suffering to an innocent, so discussing "evil" only raises irrelevant useless issues. Suffering, not evil, has been the focus of the problem since the Sumerian *Poem of the Righteous Sufferer* of 1300 BC through the Jewish *Book of Job* to modern times. The basic problem is just the logical contradiction between an innocent's *pointless suffering* under a God who could and should but does not prevent innocents's suffering.

So, "evil" is irrelevant. We assert that the more accurate name for the *Problem of Evil* is the *Problem of Suffering*. In fact, modern scholars have recognized the irrelevance of "evil" and speak only of suffering and ignore the word or concept of evil. **Bart Ehrman's** 2008 book, *God's Problem, How the Bible Fails to answer Our Most Important Question- Why We Suffer*. It says, *inter alia*, that the Bible gives several unpersuasive and contradictory arguments trying to defeat the *Problem*.

How the problem has been phrased:

The *Problem* has been stated many ways throughout history. The *Poem of The Righteous Sufferer* certainly inspired the the *Hebrew Bible's Book of Job*. The similarities are striking.

The *Hebrew Bible* also relates several other verses where innocent suffering persons plead with *their* omnipotent God for help. (These are described at 1300 BC)

Carneades phrased the problem in c.150 BC

Carneades a Platonist and Sophist c.150 BC stated, "Those who say positively that God exists cannot avoid falling into an impiety. For, if they say that God controls everything, they make him the author of evil things. If, on the other hand, they say He controls some things only, or that He controls nothing, they are compelled to make God grudging or impotent, and to do that is quite obviously an impiety." (Ref. c.150 BC)

How Cicero phrased the problem

In **Cicero's** 45 BC book, *de Natura deorum*, **Cicero's** character, Cotta, expressed the problem as:

"Either God wishes to remove evils and cannot or he can do so and is unwilling, or he has neither the will nor the power or he has both the will and the power. If he has the will but not the power, he is a weakling, and this is not characteristic of God. If he has the power but not the will, he is grudging, and this is a trait equally foreign to God. If he has neither the will nor the power, he is both grudging and weak, and is therefore not divine. If he has both the will and the power (and this is the sole circumstance appropriate to God), what is the source of evils, or why does not dispel them?" (**P G Walsh translation**)

Irenaeus, Bishop of Lyon in AD 186 responded to the *Problem of Evil*. He said persons had to experience evil and suffering to attain the spiritual status necessary to enter Heaven. (fuller details at AD 186)

How Lactantius assumed, not proved a God.

Lactantius, in *De Ira Dei / The Wrath of God*, in AD 313 wrote that **Epicurus** stated the *Problem of Evil* as follows God either wishes to take away evils, and is unable; or He is able, and is unwilling; or He is neither willing nor able, or He is both willing and able. If He is willing and is unable, He is feeble, which is not in accordance with the character of God. If He is able and unwilling, He is envious, which is

equally at variance with God; if He is neither willing nor able, He is both envious and feeble, and therefore not God. If He is both willing and able, which alone is suitable to God, from what source then are evils?" But this attribution to **Epicurus** is most certainly wrong. See AD 313, p.66, for a full explanation. **Lactantius** may have copied **Cicero**.

Abl-i-Awja **Ibn Abl-i-Awja**, around AD 629, asked, "Why are there catastrophes, epidemics, if Allah is good?"

Boethius **Anicus Boethius**, 424 BC, said, If God is, whence cometh evil? If he is not, whence cometh good?

Sankara **Adi Sankara** (788-820), Buddhist, "God couldn't have made the world as it is so full of cruelty, suffering."

Aquinas **Aquinas** named two objections to God's existence: First, "Whether God exists? It seems that God does not exist; the word God means that He is infinite goodness. If God existed, there would be no evil discoverable; but there *is* evil in the world. Therefore God does not exist."

Problem of Natural Reasons. **Stating the problem** Second objection: *The Problem of Natural Reasons*: One aspect of God's inaction is nature. "It seems that everything we see in the world can be accounted for by other principles, supposing God did not exist. For all natural things can be reduced to one principle, which is nature, and all voluntary things can be reduced to one principle, which is human reason or will. Therefore there is no need to suppose God's existence." **Aquinas** of course responded to these objections, at 1273).

Bayle **Pierre Bayle**, in his 1697 *Historical and Critical Dictionary*, denied the goodness and omnipotence of God because of man's widespread *suffering*. He argued that if God created Adam and Eve wholly good, they would not be able to sin. He then asked why God would permit the possibility of sin to become an actual sin, knowing that it would cause *suffering* of innocents. (ref. 1697)

Hume's **David Hume**, *Dialogues Concerning Natural Religion*, (1779), "Is [God] willing to prevent evil but not able? Then is he impotent? Is he able but not willing? Then is he malevolent? Is he both willing and able? Whence then is evil?" **Hume** also said in the same vein, "The world is so full of hardships and dangers it could not have been created by a omniscient and omnipotent entity".

d'Holbach **Baron d'Holbach**, "Belief in a God who has no power or justice due to the ubiquity of evil, is absurd."

Schopenhauer **Arthur Schopenhauer**, (ref. 1819) "There are two things which make it impossible to believe [in God], the suffering which abounds everywhere, and the obvious imperfection of its highest product, man."

Darwin **Charles Darwin**, "The sufferings of millions of the lower animals throughout almost endless time are irreconcilable with the existence of a creator of unbounded goodness." "I cannot see evidence of design and beneficence. There seems to me too much misery in the world." (Ref. 1856)

Draper **Paul Draper**, American philosopher: "Pointless evils exist. The hypothesis of indifference, i.e., that if there are supernatural beings, they are indifferent to pointless evils is a better explanation for pointless evils than theism. Therefore, evidence prefers that no god, as commonly understood by theists, exists." (1889)

Toynbee **Arnold Toynbee**: *A Study of History*, "This chamber of horrors [the world] cannot be any God's handiwork."

Mark Twain **Mark Twain**, "If Christ had really been God, He could have proved it, as nothing is impossible with God." "There isn't a man in the world who wouldn't cure victims of sleeping sickness if he had the power. To find the one person who has no pity for him you must go to heaven to find the one person who is able to heal him and he couldn't be persuaded to do it. There is only one father cruel enough to inflict his child with that horrible disease - only one."

Dostoevski **Fodor Dostoevski**. "The death of a child is the greatest reason to doubt the existence of God,"

Bertrand Russell, The world is so full of cruelty, evil, and suffering that it could not have been created by a loving, omniscient supernatural entity."

John Stuart Mill, **Aldous Huxley**, **Victor Stenger**, and **David Attenborough** all have emphasized *suffering*, not *evil*, regarding the problem.

Levinas **Emmanuel Levinas**, French Jewish scholar, "The benevolent . . . God committed suicide at Auschwitz."

Wiesel **Elie Wiesel**, an Auschwitz survivor, said, regarding the Holocaust, Where was God in all this? Was this another test, one more? Or a punishment? And if so, for what sins? (Ref. 1948)

- Levi** **Primo Levi**: (1919-87), another Holocaust survivor, "There is Auschwitz, and so there cannot be God."
- Mackie** **J. L. Mackie**, Australian atheist, "In its simplest form the problem is this: "God is omnipotent and wholly good; and yet evil exists." There seems to be some contradiction between these three propositions, so that if any two of them were true the third would be false. But at the same time all three are essential parts of most theological positions: the theologian, it seems, at once must adhere and cannot consistently adhere to all three. Therefore, there does not exist an omnipotent, omniscient, wholly good being." (ref 1955)
- Joseph Lewis** (ref 1956) freethinker, "If I had the power [of] **Jesus**, I would not cure one person of blindness. I would make [it] impossible, I would not cure one person of leprosy, I would abolish leprosy."
- McCloskey** **H J McCloskey**, Australian atheist, "A contradiction is involved in the fact of evil on the one hand, and belief in the omnipotence and perfection of God on the other." (Ref. 1960)
- Jones** **William R Jones**, If God is all powerful and benevolent, then why is there racial suffering in this world?
- Rowe** **William L Rowe**, wrote, *The Evidential / Probability Problem of Evil*, 1. There are cases of intense *suffering* which an omnipotent omniscient God *could* have prevented without losing some greater good or permitting some evil especially bad. (the factual premise, a fact about the world)
 2. An omniscient wholly-good being *would* prevent the occurrence of any intense *suffering* it could, unless it could not do so without thereby losing some greater good or permitting some evil equally bad or worse. (The theological premise, what a wholly good God would do.) (*Italics added*)
 3. Therefore, there does not exist an omnipotent omniscient wholly good being. (Ref 1979)
- Olen** **Jeffery Olen**, If God is perfectly good, all-knowing, and all-powerful, why is there human suffering? (1983)
- Rosen** **Gideon Rosen**, "If God exists, he is perfect (omnipotent, omniscient, all-benevolent, by definition).
 Premise: Such God could prevent unnecessary natural evils* that cause *sufferings* to innocents. [omnipotent]
 Premise: Such God would prevent unnecessary natural evils* that cause *sufferings* to innocents. [benevolent] Therefore, if such God existed, there would be no unnecessary natural evils* [*natural, not evil events*] that cause *sufferings* to innocents. (From the premises)
 Premise: There *are* unnecessary natural evils* that cause *sufferings* to innocents. (Our experience),
 So, a contradiction. Conclusion: Therefore there is no perfect traditional monotheistic God." (1999)
- A perfect God would be obligated to prevent suffering** Duty to prevent suffering: Philosopher **Luke Maring** (ref. 2012) has persuasively argued that a perfect God, like a fiduciary or other person in a position of power and authority, would prevent unnecessary or pointless suffering not as a matter of logic but because he would have an affirmative *duty* to do so. The *Bible* and the *Koran* do not mention any obligations for their Gods.
- Believers have replied to the Problem** Answers to the *Problem of Unnecessary or Pointless Suffering*: Theologians throughout history have understood the logical force of the *Problem of Suffering* and so have proposed arguments to defeat it. Most proposed answers to the *problem* have concentrated on moral *evils*, that is, humans causing innocents to suffer, and they ignore the suffering due to natural events, earthquakes, etc.
- Soul-Making argument contra the Problem of Suffering** **Irenaeus** (ref. AD 177) and **John Hick's** *Evil the God of Love* (ref.1966) argued that *Evil* or *suffering* would be acceptable if God's purpose was not to make the world a "permanently hedonistic paradise" but a place for "soul-making" where people would suffer and thereby become "children of God" worthy of Heaven.
Hick did admit this was just a speculation as he didn't know God's mind, an admission few believers make. This argument is also a straw argument as it argues people want a "permanent hedonistic paradise." No, they just don't want to suffer. (More complete discussion of **Hick** at 1966)
- Malebranche** **Nicolas Malebranche**: a French priest and rationalist philosopher argued that God permits evil to get the best balance between perfection and the simplicity and generality of His laws. (ref. 1688)
- Replies to the Problem of Suffering** **Martin Luther** proposed a version of the *Humans have limited ability* argument. "God's ways aren't our ways. Don't try to understand God's ways. Believe in the promise of salvation."
 Contra: Saying God is *good* in the first place implies that humans are smart enough to distinguish *good* from *evil*. (See 1751-**Hume**).
- Malthus** **Malthus** (ref. 1798) God permits evils and sufferings to spur creativity and productivity. A speculation.

**Free Will
defence to
refute the
Problem of
Suffering**

The most popular current proposed answer to *the Problem* is the *Free Will Defense*. A defense is not a theodicy (A theodicy offers actual reasons why God and suffering are compatible.) A defense only gives *possible*, not even probable, unique situations where a God would not be inconsistent with suffering.

In essence, *the free will defense* says as God gave humans (through Adam and Eve) the great gift of *free will*, even to sin. That means some would *inevitably* could cause suffering exercising their *free will*.

The *free will defense* says that *free will* is so great that it trumps any suffering, and God will not intervene to prevent an evil-doer's torturing an innocent as that would nullify the evil-doer's *free will*.

Believers say that God couldn't give humans free will *except to cause suffering*, i.e., In other words it says God is not omnipotent. Recall that's exactly what God reputedly said to Adam, "Eat any fruit *except* from a certain tree. Philosopher **Weisberger** (1995) said that an omnipotent God could give free will with any conditions it wanted

The literature on the *free will defense* is extensive, complex and inconclusive. Most proposed answers to *The Problem of Suffering* address moral evils (human-caused sufferings).

Modern arguments against God do not *assume* a God and seek reasons how God could permit suffering. They assert that a God *cannot exist* that does not *act* like a benevolent omnipotent God. As the *free will* argument doesn't apply to naturally-caused sufferings,

Gideon Rosen (ref.1999) posed *The Problem of Suffering* where human-caused evils were irrelevant. He has not been challenged. Simply because it's still called the *Problem of Evil*, there are theology students around the globe trying to fit "evil" into their answer to the problem.

**Leibniz
Theodicy
replies to
the problem**

Responding to **Bayle's** 1697 challenge, **Gottfried Leibniz** devised an ambitious group of arguments against *the Problem of Evil* (See 1710 and 1714) with the only full length book he published in his lifetime, *Essays of Theodicy on the Benevolence of God, the Freedom of Man, and the Origin of Evil*.

Leibniz meant the word theodicy (He coined the word.) to mean reasons how God could co-exist with suffering.

Leibniz

Many of his theodicies use the old approach and *assume* a God and some speculate on God's motives, then propose reasons how God could nevertheless coexist with evil and suffering..

It was posed as a *holiness* problem for God, not an existence problem. **Leibniz's theodicies** purport to use reason while traditional *theologies* purport to use *revelations* from a god.

One **Leibniz** theodicy: "Evil improves the good by contrast. So God can permit some evil and still be a good God." **Leibniz** said that the best world was one with the most possible good in light of the inevitable occasional evil inflicted by sinners.

This misstates reality. The suffering in the world is widespread, not "occasional." Another **Leibniz** theodicy. Being perfect, God had to and therefore did create the best possible world, even though it inevitably contained some evils and suffering. Again an *assumption*, not *proof*, of God

**People-have-
limited-
ability
reply to the
Problem of
Suffering**

Another: *The humans-have-limited-ability* theodicies: **Leibniz** proposed versions of this theodicy. He argued that due to human's limited ability, they could not be sure that there was not some greater good or some good reason justifying the evil in the world. He further argued, "There aren't any real evils, only apparent evils. Evils we see are really goods to the universe. They are only evil to Man narrow human perspective. But, **Leibniz's** God *determined* human's level of intelligence and perspective. Would a loving God make people so dumb?

This also illustrates the irrelevance of "evil" when the real problem is *suffering*.

Another **Leibniz** theodicy: God's will regarding good in the universe is like a judicial decree], but God's will regarding evils is merely permissive; and permissive willing of evils is morally

OK as long as the act of permitting the evil is a necessary condition for meeting God's outweighing obligation, namely to create the best world.

Another **Leibniz** theodicy: "As the truths of philosophy and theology cannot contradict each other (they often do), some evil or suffering, is unavoidable in any creature less perfect than its creator."

Another: Moral and physical evil add to the overall perfection of the world, and hence are not *genuinely* evil. This raises the question If there were more evil, would the world have more overall perfection? This also shows how "evil" is irrelevant to the problem.

**The Pope
abandoned**

All proposed rational arguments for God since day one were obliterated in 1988 when Pope

**rational
arguments
for God**

John Paul 2 said, “Christianity possesses the source of its justification within itself and does not expect science to constitute its primary apologetic.” This negated untold thousands of days of theologians for two millennia trying to devise plausible arguments for their God.

Karl Barth (1886-1968) Swiss, an influential Calvinist theologian, deemed it impossible to devise a theodicy that “establishes the goodness of God.” There’s no straight line from the mind of man to God. Many theologians believed that science and scholarship had made the traditional biblical view of God obsolete and Christianity would have to create images compatible with scientific knowledge.

Free Will In Western law and culture (and common sense), having *free will* is usually necessary for one to be held accountable for one’s actions. Christians require *intent* for one to sin (**Abelard**). **Genesis** says that God gave Adam and Eve *free will*, even to sin, and ordered them not to eat fruit of the tree of knowledge. Adam and Eve ate the fruit. The *Bible* says God considered such disobedience so severe that it brought sin and death into the world. Thus *Original Sin* caused *all* humans forever to be born with a disposition to sin, but unforgiven mortal sin means eternal torture

**Contra the
Free Will
Defense**

In 1751, **Hume** refuted the *free will defense* three ways.

1. It only concerns *moral evils* that cause suffering, not *natural evils* that cause suffering.
2. It ignores a victim’s *free will*. “When one evilly causes suffering, God does not intervene, i.e., God prefers the evil-doer’s *free will* over the victim’s *free will* not to suffer. And 3. The *Bible* describes times when God *did intervene* to prevent suffering. (See 1751-**Hume’s** full reasoning.)

Most arguments proposed to justify evil that causes suffering discuss moral evils, not natural evils, Remember, the problem is not a theology or philosophy problem. It’s a logic argument It depends on its premises.

A few theologians have devised arguments that blame humans for sufferings caused by natural events, for example, that God punished man through natural evils (like floods) as man was sinful.

Augustine said that natural evils are caused by fallen angels. **Plantinga** similarly said that some evil spirit may cause the ground to move to cause earthquakes. A few current-day theologians declare evil a mystery.

**Original sin
refuted the
free will
defence**

Spinoza and **Niclas Berggren** respond to the *free will defense* saying that if a God created the concept of *Original Sin* causing people to have a propensity to sin, men don’t have actual free will, and God therefore at a minimum shares the responsibility for the resultant suffering. Baptism takes away the *Original sin* but not the proclivity to sin.

**Original Sin
applies to
babies**

In addition, *The Problem of Original Sin itself*. *Original Sin* says unbaptized persons, even babies, when they die, will suffer for eternity in Hell. (Saint Bishop **Fulgentius** said this applies even for miscarried fetuses.) There is no possible justification for such a barbarous concept.

Ingersoll: “This negates any claim of benevolence for God.” (See AD 500-*Original Sin*)

**Muslim
answers to
the Problem
of Suffering**

Muslim responses to *The Problem of Suffering* are similar to Christian responses. Such as, suffering is a test of the victim, sometimes it’s a test of persons who see someone suffering, sometimes suffering is the result of sin. Also, Humans are not knowledgeable enough about Allah to understand why He permits evil. (The humans-have-limited-ability argument). Also, suffering enables Allah to see who is truly righteous, to see one’s soul. In other words, Allah has a purpose for innocents suffering. (This says Allah can’t figure out who is righteous without someone suffering.)

As earlier noted, the early answers to defeat the *Problem of Evil assumed* a God existed and sought reasons to justify why evil and suffering were okay anyway. To date, proposed refutations of the *Problem of Suffering* have not proved persuasive. Probably why **John Paul 2** abandoned them.

The *Bible* describes many matters which violate natural law and are thus not taken literally by most believers. But, if one can believe that there is some supernatural being beyond natural laws, one can believe *anything*. **William Jennings Bryan**: “One miracle is just as easy to believe as another.”

Other problems with a belief in the existence of the traditional Western God are:

**Problem of
Omnipotence
paradoxes**

God Paradoxes, a/k/a *God versus world Paradoxes* a/k/a *Omnipotence Paradoxes*. (Ref. AD 414) Like the *Problem of Suffering*, they are based on the contradictions among the claimed attributes of God, principally omnipotence, omniscience, and benevolence or other God attributes or the natural world. These arguments say the contradictions can’t all be true at one time and so negate a perfect God.

Some usual examples: Can God make a stone so heavy He couldn't lift it? Can God create a being more powerful than himself? As God created Heaven, where everything is peace and harmony and without evil, can humans have *free will* there to do evil? Can an omniscient God who knows the future change it? If He can't change it; He is not omnipotent. Can God lie? Can He build a wall so high he couldn't climb it. Can He make a puzzle so difficult he couldn't solve it?

Brutal or loving? Can God be loving and still be the brutal God of the *Old Testament*? Or, Can God be both loving and just? A loving God forgives sin, but a just God punishes sin. Is God's *omniscience* reconcilable with *free will*? i.e, if God knows every man's future, do humans have the *free will* that God purportedly gave him? These all just point out contradictions in God's claimed perfection. The theory, *compatibilism*, was devised to assert that *free will* and determinism can co-exist. (These paradoxes are at AD 414)

Problem of Scriptural incoherence *The Problem of Scriptural Incoherence:* Both the *Bible* and the *Qur'an* have compassionate passages, some of which are quoted herein. But, overall, such passages are out-numbered by many contradictory, cruel, nonsensical, factually incorrect, anti-scientific, and anti-female, slavery-affirming, passages, and obvious rewrites of other Mid-East religions which evidence human, not divine, inspiration.

Bible passages have three meanings **Augustine** had trouble understanding the *Bible*. Some theologians have said that Biblical passages have *surface* meanings and different *deep* meanings. **Augustine** felt it necessary to write a book on how to read the *Bible*. He said it required careful interpretation (by clergy).

Problem of a Small God *Problem of the Small God, Feynman's* iteration: "It doesn't seem to me that this fantastically marvelous universe, this tremendous range of time and space and different planets, and different kinds of animals and all the and all these atoms with their motions, and so on, all this complicated thing can merely be a stage so that God can watch human beings struggle for good or evil-which is all religion has. The stage is too big for the drama." (See AD 363-Julian, 1795-Paine.)

Problem of Poor Design *Problem of Poor Design* aka *The Underachiever Problem of the Design Argument:* This problem undermines both the *Argument from Design* and the *Intelligent Design Argument*.

Is the world what an omnipotent loving God would make? **David Hume**, "The *Design Argument* sees the world as a finished design. But, the world is an ongoing process which changes albeit slowly. Is the world, considered in general and as it appears to us in this life, different from what a man or such a limited being would, beforehand, expect from a very powerful, wise, and benevolent Deity? It must be strange prejudice to assert the contrary. And from that I conclude that, however consistent the world may be, allowing certain suppositions and conjectures with the idea of such a Deity, it can never afford us an inference concerning his existence."

Problem of No Reason *The No-reason Problem.* A perfect God would have no reason to create the universe as he would have no needs, wants, or desires, which are strictly subjective human concepts.

Problem of broken promises One aspect of God's no-show is *The Problem of Jesus's Promise* to give believers what they ask for. "Ask and ye shall receive:" (ref. AD 70 and 1517). It is clear, simple, unambiguous, and unconditional. All four gospels, **Matthew**, **Mark**, **Luke**, and **John** repeat this promise. (Ref. AD 65-90). Christians have prayed for millennia to end sufferings of every sort. Has God given believers what they have prayed for? All answers are personal. To find out, believers can pray for something and see. How can one reach a credible *objective* answer to a multitude of different personal prayers?

Lourdes. Why not 200 million miracle cures? A credible *objective* answer may be inferred statistically in the experience of the healing shrine at Lourdes. It has had over 200 million visitors since 1858 (now about 4-6 million per year); all visitors presumably pray to God at Lourdes to cure some ailment of their own or a loved one. Since 1858, various bishops have "validated" 69 "miraculous" cures, seven the first year, three in the last 68 years.

Skeptic investigator **Joe Nickell** said that virtually all such "miraculous" cures were of conditions most susceptible to psychosomatic influence or known to show spontaneous remission.

Even so, the obvious question is, Why not 200 million cures? God should do what He promised. **Jesus'** promise was simple, clear, and *unconditional*. **Mark Twain** said it was the *Bible's* biggest lie.

Theology: Reasons why God To protect the claim of God's goodness, Christian clergy have devised reasons for **Jesus'** *reneging*. Some *actual* reasons given: God has not given you what you prayed for (or need) as God knows what's best for you. Or, You are a sinner. Or, You haven't prayed enough. Or, God has conditions

hasn't kept his promise to give what is asked for

on when He will answer prayers. Or, You aren't a child of God. Or, You don't read the *Bible* enough. Or, You don't know God's priorities. Or, Your request wasn't on God's timetable. Or, Your prayers weren't "according to God's will." Or, It's the wrong *time* to ask. Or, You haven't repented your sins. Or, God is not important enough in your life." Or, You may have a wrong motive.

Problem of no Second Coming.

Another aspect of God's inaction was **Jesus's** promise to return to Earth even during the lifetime of some of his listeners. *Matt. 10:33, 16:28, 24:33, 2Thess. 2:1-2*. But for 2,000 years, **Jesus** has not returned. This seems to refute **Jesus's** claimed benevolence. A 2010 Pew poll found that 55% of American Christians believe that **Jesus** will probably return by 2050. The *Bible* mentioned God's failure to return, *2 Peter 3:3-4, 2 Peter 3:8-10, 1 Thess 5:2 and 4:16-18, Matt. 24:42-44, and Rev 16:15*, but did not provide an answer *why*.

Theology: Reasons why God hasn't kept his promise to return

Why hasn't **Jesus** returned? Some theologians have given reasons. **Billy Graham**, "God wants to give everyone an opportunity to know about Christ and turn to Him in repentance and faith." Or, God "is STILL waiting for His people to start LIVING the gospel." Or, "He does not want anyone to perish, so he is giving more time for everyone to repent" Or, "God has a different concept of time. To Him a day may be a thousand human years." Or, Other theologians say that God hasn't returned as if He did, nobody would believe Him. Or, Evangelical pastor **Jesse Duplantis**, People are not giving enough money to their churches, Or, God hears people's concerns and we must trust in God's goodness.

Pearl Bailey: People see God daily

One theological reply to **Jesus's** no-show is that He *has* returned and can be seen by his works. Presumably not works like plagues or starvation or tsunamis (acts of God?). This is the *Design Argument*. **Pearl Bailey** had an answer, "People see God every day; they just don't recognize him." **Hume** asked, "Is the world what one would expect if there were an omnipotent benevolent God?" (Similar questions have been asked. Why are there diseases? Why are some people so mean, or dumb, or disabled, or blind or deaf? What's in it for a loving God for people to be like they are?)

Universe acts like no God

The issue of unfulfilled promises is a theological problem. **Richard Dawkins**, an atheist, said, "The universe we perceive has precisely those properties we should expect if there were at bottom, no purpose, no design, no good, no evil, nothing but blind pitiless indifference."

Biblical errors

Some modern theologians say that pointing out *Biblical* errors is missing its essence, as **Andrew Dickson White** proposed in 1896. **White** was rebuffed. Modern theologians ignore Hell, miracles, the errors and contradictions and emphasize their religion's psychological and social benefits. Christian theology today is largely seeking arguments to justify the *Bible*.

Problem of an unknowable God

Problem of an Unknowable God: Classical theists say it would contradict the transcendent nature of God for mere humans to define him, that "God is outside of time, space, and matter."

Aquinas for example said that one cannot know what God is but rather what he is not. *The Book of Job, Anselm, The Bible (Romans 11:33-34), Johannes Scotus Eriugena, Maimonides, Pseudo-Dionysius, Martin Luther, Gregory the Great, all said the same. Augustine* ("If this be God, thou hast not comprehended it.") **Pascal, Ockham, and The National Catholic Almanac** all say one cannot know what God *is*." "Great is the mystery of godliness" *1Timothy 3:16*. Cardinal **Nicholas of Keus/Cusa** said, "If God is unknowable, incomprehensible, how can anyone make any authoritative statement about him, good or bad, or even if he exists. **Wittgenstein:** "A nothing will serve just as well as a something for which nothing can be said."

Problem of Faith

The Problem of Faith: **Arthur Balfour's** 1896 *Foundations of Belief*, said, "Arguments for God are not conclusive, so faith is needed to believe. But, faith, in and of itself, validates any supernatural being or belief, from the monkey god, to Isis, Zeus, **Jesus**, Satan, Marduk, or Allah. **Bertrand Russell:** Faith means one believes something without evidence. **Mark Twain:** Faith is believing something you know ain't so."

Invoking faith

For most Western educated people today the concept of a loving, omniscient, omnipotent, being who does not show up, who is unknowable, incomprehensible, and permits great suffering, is not plausible. Religion is looked upon as something that gives comfort or inculcates moral values and a fear of acting wrongly in simple people and in children. **Thorstein Veblen** (ref 1899), "As a general rule,

stops all discussion	the classes that are low in economic efficiency, or in intelligence, or both, are particularly devout.” Sam Harris: “The problem with faith, is that it really stops discussion. Faith is a declaration of immunity to the powers of persuasion. It means you do not have to give reasons for your belief.”
Problem of Hell: Salvation is Christianity's reason for existing.	<i>The Problem of Hell.</i> There are many verses in the <i>Bible</i> describing Hell as eternal torture by fire. <i>Salvation</i> from Hell is Christianity's purported reason for existing. For Catholics, living a pious life but missing a mass without it and being forgiven, means infinite torture for <i>eternity</i> . Total pain 24 hours a day for eternity. All it takes to go to Hell, according to the <i>Bible</i> , is knowing about Jesus and not accepting him as Savior. Robert Ingersoll: “This dogma of Hell is the infinite of savegry-the dreams of insane revenge . . . It makes Christ as merciless as the fangs of a viper.” Today, as infinite eternal punishment for a finite act is seen as unfair, modern Christian theologians have toned down their descriptions of Hell or simply never mention it. For example, in 1999, John Paul 2 blandly said, “Hell is “a state of definitive self-exclusion from communion with God and the blessed.” Where's the lake of fire? This is theology. The Church controlled its members for centuries with the threat of <i>eternal, excruciating</i> pain. John Paul now said it's just being not <i>in communication</i> with God.
Nietzsche All imaginary	“Neither morality nor religion is in contact with any point of reality. Nothing but <i>imaginary</i> concepts, sin, soul, grace, god, salvation, spirits, temptation by the devil, free will, forgiving sin, all imaginary.”
How can the most pious man know what God wants?	Hume said in 1751 that a fatal error of <i>all</i> theodicies is their asserting that “suffering is a necessary precondition or outcome of some greater good. Saying evil is good is nonsense. This is contrary to human experience. The distinction between good and evil depends on the human mind and can't be altered by some philosophical theory or speculation . . . If God can justify an evil for a reason incomprehensible to Man, what can the most moral religious man know what God wants?”
Problem of no credible evidence.	The sum total of all the aspects of God's absence is the <i>Problem of no Credible Evidence</i> . That there is no plausible evidence that a God exists is the basic atheistic argument. Atheists of course agree that <i>The Problem of Suffering</i> negates the traditional Western God.
Atheists' arguments	Atheism as such infers no moral code. As a result, most atheists adhere to some a moral code like humanism. Atheists argue that they can be moral without the threat of eternal torture. This seems more valid than being good out of fear of Hell. Atheists can of course have no moral code. James Haught , an atheist author, calls mentioning one's religious doubt is America's last taboo.
Dawkins	The vast majority of clergy persons are decent humble persons who have given up riches and pleasures to help mankind. Most atheists are similarly decent persons with different beliefs regarding supernaturalism. Richard Dawkins: (ref. 1973, '76, '79), “One can't absolutely prove that a god <i>doesn't</i> exist, but the absence of <i>any</i> evidence that a god <i>does</i> exist makes a god so unlikely that one <i>can</i> assert with <i>scientific</i> certainty but not <i>absolute</i> certainty that a god does not exist. (Dawkins is referring to any and all gods, not just an Abrahamic God.) Dawkins also said, “We are all atheists about most of the innumerable gods that humanity has ever believed in. Some of us just go one god further.”
Michener	James Michener: “I'm a humanist. I believe humanity can with constant moral guidance create reasonably decent societies To understand the world, one can profit from the works of Plato and Socrates , the behavior of the three Thomases , Aquinas , More , and Jefferson — the austere analyses of Immanuel Kant , and the political leadership of Abraham Lincoln [a non-church-goer] and Franklin Roosevelt .
Hitchens	Christopher Hitchens , “Theologians have never been able to answer the challenge that contrasts God's claims to simultaneous omnipotence and benevolence with [the reality of suffering].” At a large meeting of pastors, Hitchens said, “There is no ethical principle that a believer could make that an atheist could not make.” (One pastor shouted, How about tithing? Hitchens could have but did not say, “Well for some I guess its just the money.”) Regarding evidence for a God, “That which can be asserted without evidence, can be dismissed without evidence.” “Very often, when I give my view that there is no supernatural dimension, I am asked, How do I find meaning and purpose in life?
How does an atheist find a meaning for his life?	How does a mere . . . materialist, with no expectation of a life to come, decide what, if anything, is worth caring about? The answer? A life that partakes even a little friendship, love, irony, humor, parenthood, music, and literature, and the chance to take part in battles for the liberation of others cannot be called meaningless.”

- Einstein** **Albert Einstein**, "I cannot imagine a God who rewards and punishes the objects of his own creation." **Einstein** said to **Max Born**, "You believe in the God who plays dice. I in complete law and order in a world that objectively exists."
- Darrow** **Clarence Darrow**, "I don't believe in God because I don't believe in Mother Goose." (1930)
- Watson** **James Watson** (ref 1953-DNA), "The biggest advantage to *believing* in God is you don't have to understand *anything*. No physics. No biology." No nothing. **Dalai Lama**, "My religion is kindness."
- Stephen Hawking** **Stephen Hawking**, "I am an atheist. . . .the universe is governed by the laws of science " "There is a fundamental difference between religion, which is based on authority, and science, which is based on observation and reason. Science will win because it works." "The brain is a computer which will stop working when its components fail," "The concept of an afterlife is a fairy story for people afraid of the dark."
- Atheists's opinions**
- Durant** **Will Durant**: "Does history support belief in God? A reluctant no. What has diminished the power of religion? 1. The growing awareness of man's minuscule place in the cosmos. 2. Different dogmas in Protestantism. 3. Biblical criticism. 4. the Reformation. 5. Frauds, inquisitions, massacres. 6. The rise of skeptics. 7. The *Enlightenment*. 8. Scientific advances. In Christendom, the decline began with **Copernicus**. By 1611, **John Dunne** said "the new philosophy calls all in doubt." **Francis Bacon** was proclaiming science as "the religion of the modern emancipated man. "We are emancipated from theology."
- Atheists's quotations**
- Asimov** **Isaac Asimov**: "Properly read, the *Bible* is the most potent force for atheism ever conceived."
- Atkins** **Peter Atkins**, philosopher, chemist, "[Religious belief is] outmoded and ridiculous. [Belief in gods is a worn out but once a useful crutch in mankind's journey towards truth. . . the time has come for that crutch to be abandoned. To say that 'God made the world' is simply a more or less sophisticated way of saying that we don't understand how the universe originated.
A god, in so far as it is anything, is an admission of ignorance. Religion utterly failed to provide an explanation of the biosphere other than that 'God made it all'. . . teaching religion is purveying lies."
- Russell** **Bertrand Russell**, Religion is "a disease born of fear and is a source of untold misery to the human race."
- E O Wilson** **Edward O Wilson**: "Religion is dragging us down and must be eliminated for the sake of human progress."
- Humanism** Philosophy: All ideologies have sub-groups with differing beliefs. Christianity has hundreds of sects of every size. Humanism without any governing organization also has varying philosophes including some so close they are considered naturalistic humanism and humanistic naturalism.
- Lamont** One prominent humanist, **Corliss Lamont**, defined humanism as "a philosophy of joyous service for the greater good of all humanity in this natural world and according to the methods of reason and democracy." (more humanism in the Index)
- Sainthood requires, Miracles** Sainthood: One miracle (recently reduced from two) is now needed for Catholic sainthood. The usual "miracle" now common for sainthood is that someone somewhere, often a nun, was cured of a malady after touching something connected to the saint-candidate. While such miracles may suffice for canonization, they are usually personal and scientifically suspect.
Simon Blackburn (1944-), Brit, professor, atheist, "A little miracle or two snuffing out the **Hitlers** and **Stalins** would seem far more useful than one that changes water into wine at a wedding." "One man's revelation is another man's lunacy. Delusions are contagious and emotions are malleable."
- Leibniz: Why does matter exist?** **Von Leibniz** asked, "Why is there something rather than nothing?" As posed, "Why" makes it a theological question, not a scientific question. **Leibniz** meant it as a rhetorical question to infer God's existence. There are over one hundred known creation myths. All cultures from A to Z, Apaches to Zunis, have different non-rational, unverifiable, creation myths to answer **Leibniz's** question.
Asking "*why*" is not *scientific* as that asks for a *purpose* or reason for a natural event, the existence of matter. But, natural events have no *purpose*. Asking *why* precludes a scientific answer.
Eminent philosopher **Adolf Grünbaum** called it the *primordial existential question* and in 2007 said it is an ill-conceived non-starter which poses a pseudo issue, and "the philosophical enterprise need not be burdened *at all* by the question as it is just a will-o'-the-wisp."

Why not?	Brian Leftow said the universe can't have a causal answer, as any cause itself requires a cause.
How is there something?	<u>But the thought remains.</u> So a scientist would ask, "How" is there something rather than nothing?" This would be a scientific question seeking a scientific answer. It is the most difficult and yet unanswered question for cosmologists. That things need a cause appeals to "common sense" and is the premise of <i>cosmological</i> arguments. However, top cosmologists like Wilczek, Tryon, Hawking, Krauss, and Stenger do not believe that the universe needed a cause.
How does matter exist?)	Hawking : "As there is gravity, the universe can and will create itself from nothing. Spontaneous creation is the reason there is something rather than nothing, how the universe exists, how we exist. It is not necessary to invoke God to set the universe going."
	Victor Stenger's <i>The Fallacy of Fine Tuning</i> (ref. 1974) said that no laws of physics were violated in bringing the universe into existence. The natural laws of physics correspond to what one would expect if the universe appeared from nothing. <i>Something</i> is more stable than <i>nothing</i> .
Cosmologists study several theories of creation	Cosmologists study various theories regarding the origin of the universe; namely grand unified theory, boom and bust cycles, brane universes, cosmological phase transitions, chaotic inflation, pocket universe, string theory, vacuum stabilization, loop quantum gravity, ion propulsion, particle-anti-particle pair production out of nothing, quantum foam universe theory. There is no consensus. There <i>may</i> yet be found the answer. Feynman (ref. 1949, '73) was once asked to explain in simple terms why he got his Nobel prize. He said that if it could be explained simply, it wouldn't be worth a Nobel.
Adam just wanted knowledge	According to <i>the Bible</i> , Adam and Eve's act which so angered God that it brought evil into the world and caused every man, woman and baby that ever would come to exist to burn in extreme pain for eternity unless they accepted Jesus as their God, was simply Adam's desire for knowledge.
Empty your mind of secular learning	The major Western religions have a history of silencing dissenting opinions. Archbishop John Chrysostom criticized those who speculated about God as it was faith that mattered. He said, "Restrain our own reasoning, empty our mind of secular learning to provide a mind [to receive] divine words." The Christian Church fervently opposed teaching Copernicus's heliocentrism simply as it had been telling people that the Earth was the center of the cosmos. Heliocentrism negated that. The Vatican killed Giordano Bruno for saying Earth might not be the center of the universe.
Catholic fear of knowledge.	<u>Catholic fear of knowledge:</u> <i>The Index of Prohibited Writings</i> declared it a sin to <i>print, own, read, or even discuss</i> , all or some works of: Abelard, Lord Acton, Addison, d'Alembert, Francis Bacon, de Balzac, de Beauvoir, Cesare Beccaria, Bergson, Bruno, Bentham, Berkeley, Jean Calvin, Casanova, Comte, de Concordet, Copernicus, Benedetto Croce, Descartes, Dante Alighieri, John Draper, Defoe, Diderot, Dumas pere et fils, Darwin, Erasmus Darwin, Desiderius Erasmus, Scotus Eriugena, Flaubert, France, Frederick 2 of Prussia, Galileo, Gesner, Gibbon, Gide, Goldsmith, Graham Greene, Grotius, Thomas Hobbes, Heine, Helvetius, Hugo, David Hume, Kant, Kowalska (later made a saint), Kepler, the Larousse Dictionary, D H Lawrence, Locke, Martin Luther, Machiavelli, Maeterlinck (Nobel in literature), Marx, Maimonides, Malebranche, J S Mill, Milton, Montaigne, Montesquieu, Pascal, Thomas Paine, Proudhon, Rabelais, Renan, Rosmini, Rousseau, George Sand, Sartre, Spinoza, de Stael, Bayle, Stendhal, Lawrence Sterne, Swedenborg, Jonathan Swift, Maria Valtorta, Voltaire, Zola, Zwingli, and scores more lesser known authors, and all writings saying the Earth orbits the Sun.
The Index of Prohibited Writings	
Catholics couldn't talk about the Earth orbits the Sun	
Religions's actions to stifle dissent	In addition to the above persons on the <i>Index</i> , the Church opposed Albertus, Ockham, Joachim of Fiore, Wycliffe, Jan Hus, Lucilio Vanini, Dolet, la Peyrere, and Pico della Mirandola , for questioning Church dogma. Other persons attacked by the Church, like Charles Darwin , were not threats to Jesus's teachings; only threats to the high clergy's positions of personal power and authority. Roger Bacon , the greatest scientist of his day, was confined and / or surveilled over 20 years for "suspected novelties" in his teachings. Aquinas : The greatest sin is not murder or torture but having a wrong <i>thought</i> , not believing in his God. (Dalai Lama , lama of the Tibetan school of Buddhism that incorporated the Hindu doctrine of Tantra, "There is no need for temples; no need for complicated philosophy . . . The philosophy is kindness.")
Why torture for Jesus?	The <i>Inquisitions</i> tortured for Jesus . Why?: H G Wells in 1902 said, regarding the inquisitions, "It was just because many of the Church leaders probably doubted secretly the entire soundness

H G Wells: Because clergy feared heretics were correct	of their vast and elaborate doctrinal fabric that they would brook no discussion of it. They were intolerant of questions or dissent, not because they were sure of their faith, but because they were not." Such doubt suggests why clergy have felt it necessary to devise <i>arguments</i> for God. John Draper, (ref. 1860): [Science] has never subjected anyone to. . . torment. . . torture,. . . or death, [to] uphold or promote its ideas..
Actions to stifle dissent	Bishop Tempier in Paris in 1270 prohibited teaching 13 philosophical <i>ideas</i>, and in 1277, 219 such ideas. Pope Honorius 3 sent Dominicans and in 1230, Franciscans to U. of Paris to halt the tide of free thought. Presbyterians killed Thomas Aikenhead, a 20 year old Scot, for questioning their religion. Catholics and Anglicans made it a sin to own or read "unapproved" editions of the <i>Bible</i>. Mention of sunspots was banned at Catholic universities across Europe, in Spain until the 19th century.
Actions to stifle dissent	<u>Dominicans were forbidden to study medicine or science</u> except with special permission. Franciscans couldn't study medicine or "science." Martin Luther bitterly attacked reason itself. Christian churches taught that comets were omens from God. Jesuit teachers didn't teach their Chinese students about heliocentrism for 200 years after Copernicus
Actions to stifle learning	Pope Zachary: "To believe that the Earth is a sphere is a heresy and deserves excommunication." The Christian Church prohibited dissection of humans for medical research. The Christian churches taught that diseases were punishments from God. In Alexandria, Bishop Cyril's monks murdered Hypatia, a famous teacher, for being a pagan. <i>The Holy Inquisition</i> convicted Galileo for "suspicion of heresy" for writing about heliocentrism.
Book burning	Pope Alexander 6 ordered burning all books that questioned the Church's authority. Catholic persecutions of Bruno, Vanini, and Galileo largely stopped scientific inquiry in Catholic Europe. Jesuit professors were repeatedly prohibited from teaching atomist physics. Parisian bishops forbade talk about scientific subjects in vernacular French. Peasants only spoke French Christian churches opposed Benjamin Franklin's lightning rods on religious grounds President Bush prohibited study of stem cells for religious reasons.
Actions to stifle learning	Gregor Mendel's bishop prohibited his abbey's monks, a teaching abbey, to teach biology. Christian, Jews, and Muslims treated women as property for millennia. Publishing the Bible in English was a capital offence in England William Tyndale, a priest, published an English translation of the <i>New Testament</i>. To escape Henry 8, he fled to Belgium. Henry had him jailed there and convicted of heresy, publicly garroted, his corpse burned. Catholic universities didn't teach Newton's laws of motion for a century after other scholars praised it. Prince Leopoldo de Medici in 1657 founded and led an academy of experimental science, the <i>Accademia del Cimento</i>. The pope declared the academy <i>irreligious</i> and destroyed it by making Leopoldo a cardinal.
Religions' actions that stifled learning	Catholic fear of learning: Pope Pius 10 (papacy, 1903-14) listed 65 "heretical" beliefs, basically all those beliefs that said humans influenced Church dogma. He also prohibited seminarians from <i>reading</i> newspapers and required them to swear an oath against <i>modernism</i>. Christian Churches always decreed that scientific hypotheses could not contradict scriptures in any way. Catholics may only accept evolution if they believe that God at some time put a soul in the human species.
Actions to stifle learning	The Christian churches opposed Darwin. The Anglican Church strongly opposed Lyell's theory of the "extreme" age of the Earth. (He said Earth was "millions of years old. He missed it by 13 billion years) Jesuits stopped Leibniz to open an <i>Academy of Science</i> in Vienna as he said species may not be immutable. Pope Leo 13, "It is quite unlawful to defend, or grant unconditional freedom of thought, or speech, or worship, as if these were so many rights given by nature to Man." Samuel Johnson, "The Roman Church [has]..determined. . .what is a crime to do; it is a crime to think." Thomas Jefferson, "Priests . . . dread the advance of science as witches do the approach of daylight." "In every country and in every age, the priest has been hostile to liberty. He is always in alliance with the despot, abetting his abuses in return for protection to his own."
Men don't need to	Quintus Septimus Florens Tertullian, "It isn't necessary for Man to think as God has done it for them."

think. **H L Mencken**, Christian theology is not only opposed to the scientific spirit; it is opposed to every form of rational inquiry. Secular totalitarian states also forbid discrediting the regime.

Muslim fears dissent like Christians Islam fears dissent at least equal to Christians. In 1515 the Ottoman Empire's Sultan **Selim 1** issued an order prohibiting use of the printing press due to pressure from Ottoman scholars that it would be rude to the *Qur'an*. The Muslim world did not utilize the printing press. The Ottoman Empire had no printers til 1727, then a printer printed 17 books, none religious. It closed in 1742.

Islam's aversion to new ideas in science (with a few exceptions) has caused the Arab world to lag far behind science-friendly nations socially. These circumstances have heightened a sense of inferiority and shame among Muslims, leading to behavior like honor killings and protests against cartoonists, which are nonsensical and dangerous to educated Westerners."

Muslim fear of dissent Islam is particularly insecure and fearful of ideas thought disrespectful of **Mohammed**. The principal imam of Iran issued a "fatwa", an order to all Muslims to kill **Salman Rushdie**, for a passage in a book he wrote purportedly disrespecting **Mohammed**. Muslims are forbidden to convert to any other religion. (As **H G Wells** reasoned, "They're afraid heretics may be right.

To Muslims political dissent is religious heresy In Islam there is no distinction between religion and government. The *Organization of Islamic Cooperation* ("OIC"), representing 57 mainly Muslim countries, opposes the free speech provisions of the U.N.'s *Universal Declaration of Human Rights*. OIC says that human rights are not founded on universal secular principles but on divine ethics.

A sub-group of OIC in 1990 issued the *Cairo Declaration of Rights in Islam* that declares that "No one has the right to violate or ignore 'the fundamental rights and universal freedoms of Islam."

The *Cairo Declaration* also states that in all OIC states all rights and freedoms are subject to *Shari'a* law. OIC currently seeks to have the UN forbid the "defamation of religion." "Defamation" is not defined. Muslims, Jews and Italians have organizations whose principal job is opposing language disrespectful to their cultures.

Dissent is punished not because it is false, but because it may be true. Most clergy serve devoutly without regard to their personal position or ambition. They are true believers. The high clergy, however, have a more difficult job. They must maintain the *raison d'etre* of their enterprise and manage it. To do so, they must make the beliefs on which their enterprise is based believable and relevant to their believers.

So religions remain prisoners of their ancient myths. Theological dissent is punished, sometimes most severely, not because the dissent is wrong, but because it may be true.

Western religions caused their own decline. **Paul Tillich**, a well known Lutheran theologian, commented on this difficulty facing the high clergy, "The first step to the non-religion of the Western world was made by religion itself when it defended its great symbols, not as symbols, but as literal stories; it had already lost the battle."

To **Tillich**, the statement "God is dead" just meant that the ancient image of an all-powerful demanding God was not an effective story and that theologians had to modernize their message.

Sins are acts hurtful to the clergy. **Voltaire**: "In religion, [sin] is not actions hurtful to society, but actions hurtful to the clergy." **Spinoza**: "Immense efforts have been made to invest religion, true or false, with such pomp and ceremony that it can sustain any shock and constantly evoke the deepest reverence in its worshippers."

High clergy act to protect their turf, not to protect their theology. The clergy's opposition to ideas that threaten their dogmas is thus best understood as based not on theology but on their desire to continue their position of social control, i.e. to protect their turf. How so? **Hume** explained in 1741, "Liberty of thinking and of expressing our thoughts is always fatal to priestly power. In all ages of the world, priests have been enemies of liberty; and it is certain that this steady conduct of theirs must have been founded on fixed reasons of interest and ambition." The rulers quoted at 1532 reveal that they use religion to control folk, while they themselves disdain it.

Clergy protect kings and vice versa **Bertrand Russell**, "The clergy have been part of the ruling class; their dogmas have favored the rulers." **Robert Ingersoll**, "In all ages hypocrites called priests have crowned thieves called kings." In all South American revolutions for independence from Spain, the church sided with the rulers. **H L Mencken** (ref. 1925), "[The clergy's] prayers always go up for kings, not for. . . reformers."

Anglicans During the 17th to 20th century, the *Protestant Ascendancy* in Ireland, the small ruling class of Anglican

ruled Ireland clergy and landowners, impoverished the more populous Catholics, who had to tithe to the Anglican church.

In the 1930s The High clergy of the Catholic and Protestant churches in Germany and Italy sold out their believers' political freedom to **Hitler** and **Mussolini** for money.

Clergy oppose *supernatural* belief systems like witchcraft and other religions) as well as *natural* belief system (science) simply as both systems *compete* with that clergy's particular belief system. Most educated people believe that natural laws govern the universe and that humans can discover such laws. Hundreds of millions of people however believe there is a supernatural power which can and does violate such natural laws.

What difference have religions made? What difference has it made to have "priests" speaking for an invisible, omnipotent, all-knowing entity instructing humans how to act and what to think?

On the plus side, most religions's rules are simply practical rules of behavior that keep peace in the community. As Roman **Seneca** (ref.1532) said for rulers, religions are useful.

The mattering instinct Professor of Counseling Psychology **Timothy Church** has named several psychosocial functions which have been attributed to religion. 1. Offering consolation and support. 2. Ameliorating fears of death. 3. Promoting self- transcendent experiences and emotions. 4. Addressing uncertainty and loss of control. 5. Providing a sense of meaning and purpose. 6. Monitoring moral or prosocial behavior. 7. Providing a sense of community and belonging. **They make people feel significant** He adds that non-divine institutions can generally provide equivalent experiences.

They comfort people Religions can give people a sense of identity. Importantly, religions can help people believe that they matter. Religions tell you that you matter to God. God sacrificed his son for you. He made you in his image. They can serve the human need for people to feel significant. Most people feel a need to connect with something significant, Religions have caused some people to be cooperative, charitable. They can give a structure to people's lives,. (See 2018-Psychology)..

Spiritual Many people never give religion as such much thought. Educated persons who attend religious services likely know little of their religions' histories or dogmas but find comfort in believing that there is some supernatural entity who loves them and is looking out for them. Some thinkers recognize the imperfections of organized religions, but consider themselves "spiritual" with a gut feeling that there *just must be something* beyond their ken that gives meaning to their lives.

Religions have enabled millions & millions of pointless deaths and sufferings in wars as each side believed that their god wanted them to kill. On the minus side, **Voltaire**, "Anybody who can make you believe nonsense can make you commit atrocities. Religions have been the rationale for millions and millions of pointless deaths, tortures, and sufferings throughout history. Islam spread basically by conquest/killing. The Christian churches were instrumental in enabling **Hitler** to destroy much of Europe and cause the deaths of 40-50M military and civilian persons and displace tens of millions more. The pope was silent as **Hitler** killed. In addition, intra-religious wars, Catholics vs. Protestants, Christians vs. Muslims and Jews (like the Crusades), Hindu vs. Muslim. Jews vs Muslim. All because one or both sides believed tat their moral leader, their God, wanted them to kill. Religions have retarded honest independent thought, even simple scientific thought. When religions dominated all thinking as in the Dark Ages and Middle Ages, ordinary people's lives got no better for several hundred years.

Christian churches have caused their believers to live in abject constant fear of eternal torture in Hell for disobeying priests' commands. Such belief has given immense power to a class of people who may or may not have the best interests of the believers they influence in mind.

Steven Weinberg, "Good people do good things. Evil people do evil things. But for good people to do evil things; that takes religion." Monotheistic religions' believers are more warlike than polytheistic religions against other faiths as monotheists are the most sure that their beliefs are the *only* true beliefs. **Blaise Pascal**, "Men never do evil so completely and cheerfully as when they do it from religious conviction."

Nehru said, "No country or people who are slaves to dogma and dogmatic mentality can progress.

I want nothing to do with any religion that keeps the masses satisfied to live in hunger, filth, and ignorance, or any order, religious or otherwise, that does not teach people that they are capable of becoming happier and more civilized, on this earth, capable of becoming true *man*, master of his fate and captain of his soul."

Religions have delayed scientific advances that benefitted humans well being. They have caused half of

humanity, women, & subjected peoples, to be kept from scientific, educational, social, & political pursuits.

Excusing their Scriptures Some theologians excuse unscientific false Scriptural passages by saying they were written by humans who were ignorant of the world. This is true but voids the claim that Scriptures were divinely inspired. Some persons excuse the cruel histories of believers by saying they only did what they had to do to protect their God. These explanations negate the divine nature of the Abrahamic God.

Do not confuse intelligence with knowledge. **Mark Twain**: "The man who does not read has no advantage over one who can not." The industrial revolution in England was run by people who learned practical knowledge, not by aristocrats who got a diploma from Oxford or Cambridge solely because they were aristocrats. Ohio Episcopal Bishop **Henry Hobson**: "A great majority of our members are woefully *ignorant* about any real knowledge of Christianity. Judged by any standard, they are in the moron class."

What do Americans believe? **Mark Twain**, "It ain't what you don't know that gets you in trouble. It's what you know for sure that just ain't so." Every culture and country have widely held beliefs, myths, superstitions, about their culture or country. Creation myths range from bizarre to unbelievable. Creation stories are now considered myths by the great mass of people, yet have dedicated followers. Creationists can choose Young Earth Creation, Old Earth Creation, Evolutionary Creation, or Intelligent Design.

Conspiracy Theories Conspiracy theories are theories that explain an event or set of circumstances as the result of a secret plot by usually powerful conspirators. Many conspiracy theories relate to clandestine corporate or government plans and/or elaborate murder plots.

What do we believe? Conspiracies do exist of course. There *are* situations where people do agree secretly to cause someone's suffering. Such agreements can occur among all classes of people, high and low. **Yuval Harari** (2014-5) cautions us to make a distinction between those who promote conspiracy stories for an improper purpose and those who simply believe the theories. "It is near impossible to accurately generalize about widespread false beliefs other than to say that the people who promote them have an agenda and know more and than those who just believe them."

Conspiracy theories Conspiracy theories are popular: According to a 2016 study by Chapman University (Cal), 54% of Americans believed that the US government is concealing what it knows about the 2001 attack on the World Trade Center. For **JFK's** assassination, it's 50%. For alien encounters, it's 43%. For global warming, it's 42%. For plans for a one world government, it's 42%. For **Barack Obama's** birth certificate, it's 30%. For **Antonin Scalia's** death, it's 28%. For the 1969 moon landing, it's 24%. These figures show a widespread ignorance of proven facts and/or distrust of government.

What do Americans believe American Weird Beliefs: The variety of false beliefs and theories held by Americans is staggering. There are widespread beliefs about the deaths of celebrities, Pyramid power. Miracle cures. Ghosts. Homeopathy. Dowsing. Clairvoyance. Mental telepathy. Fortune telling. Flying saucers. El Dorado. *Feng shui*. *Chi*, the life force. Hollow Earth. Cold fusion. EST. ESP. Witchcraft. Psychic surgery. Psychokinesis. Flat Earth. New Apostolic Reformation. Parapsychology. Lizard people. "Alternative" medicines. Astrology. God's influence on the Super Bowl or an election. UFOs. Quantum Healing. Alien abductions. Magnetic power energy, Scientology.

Worldwide nonsense beliefs Worldwide, Alchemy, Mermaids. Reincarnation. The philosopher's stone. The fountain of youth, Phrenology. Aether. The elixir of life. *elan vital*. The Seven Cities of Cibola. Amazons. Crop circles. Patagonian giants, Prester John, Fascinus, Atlantis, Fairies, the healing power of tobacco, Extraterrestrials, Tulip bulbs.

Books about false beliefs Nonsense beliefs are well documented: A few such books are: *Extraordinary Popular Beliefs and the Madness of Crowds*. *Why People believe Weird Things*. *The Believing Brain-From Ghosts and Gods to Politics and Conspiracies-How We Construct Beliefs*. *Weird Earth-Debunking Weird Beliefs About our Planet*. *The Republic of Lies-American Conspiracy Theorists*. *How to Think About Weird Things*. *Passport to Magonia-From Folklore to Flying Saucers*. *The Unpersuadables: Adventures with the Enemies of Science*.

What do Americans know? 2010: Pew Research Center poll: 55% of Protestants didn't know **Martin Luther** started the Reformation. 45% of Catholics didn't *know* what *transubstantiation* is. 43% of Jews didn't *recognize Maimonides*. Over half of Americans couldn't name the first book of the *Bible*. 33% said that they believe the literal words of the *Bible*. 46% couldn't name one Supreme Court decision.

2011: *Newsweek*: 38% of 1000 adult Americans could not pass the U S citizenship test. 33% didn't *know* the Vice President's name. 47% didn't *know* how long it takes Earth to orbit the Sun, i.e. how long a year is.

Nat. Academy of Sciences: "Biological evolution is the central organizing principle of modern biology." But, a 2014 Pew poll: Only 14% of weekly church-goers believe in evolution. It's higher in the general population.

2014: Univ. of New Hampshire Casey Institute poll: Only 28% of Tea Party Republicans trust scientists.

2014: Professors **Tony Yates** and **Edmund Marek** found that 25% of Oklahoma high school biology teachers thought humans and dinosaurs co-existed. (Missed it by 65 million years)

2015: The Educational Testing Service (ETS) said Dutch, Japanese, and Finnish high school graduates know as much as young US college graduates. **The** ETS also said that the US is last in tech proficiency of 22 industrialized countries, and 20th in literacy proficiency.

Am. Council of Trustees and Alumni poll: 10% of college grads said Judge **Judy** was on the Supreme Court.

2016: The Public Religion Research Inst: 57% of white Evangelicals: God had a direct hand in electing **Trump**.

What do Americans believe?

2017: A *Politico* poll: 76% of Republicans said news organizations make up stuff about **Donald Trump**. A Pew poll: 38% of Americans believe God created Man under 10,000 years ago.

Pew poll, almost 30% of Americans believe in astrology.

The U S is the most ignorant of basic facts of the 31 most advanced industrialized countries.

2018: Pew Center on Religious and Public Life: Over 80% of "highly religious" and "somewhat religious" Americans believe Hell is a real place. Under 5% of non-religious persons do.

National Science Foundation: 28% of Americans believe the sun orbits the Earth.

2019 survey of 418 persons (59% female) opined atheist rape victims were more amoral than believers.

2021: Pew poll, 14% of Americans agreed that, "The government, media, and the financial world are controlled by a group of Satan-worshipping pedophiles who run a global child-sex-trafficking operation trying to control our politics and media." 37% said they didn't know.

2023 **Annenberg** online poll: 17% of Americans can't name any branch of government. 7% can name only one. 20% could not name a single right protected by the First Amendment. USA Today poll: 56% of persons who most trust Fox News say humans didn't evolve. God created them in their present form.

2025 Gallup poll: 48% believe in the psychic or spiritual power of the human mind to heal the body.

39% believe in ghosts or spirits of dead people can come back in certain places and situations.

29% believe in telepathy or communication between minds without using the traditional five senses.

Scientists and philosophers differ dramatically from the general population. Only 7% of Nat. Academy of Science members and 14% of English speaking professional philosophers, mainly academics, believe in God. While European countries differ, overall, Europe is vastly more secular than the U S.

In sum: **Socrates**, "There is only one good, knowledge, and one evil, ignorance."

Isaac Newton, "I seem to have been only like a boy playing on the sea-shore. . .now and then finding a smoother pebble or a prettier shell. . ., whilst the great ocean of truth lay all undiscovered before me."

H G Wells, "Our world today is only in the beginning of knowledge."

Pierre Simon, Marquis de Laplace, "What we know is not much. What we do not know is immense."

Jared Diamond, "The chimpanzee's closest biological relative is not the gorilla but humans."

Albert Einstein, "Any fool can know. The point is to understand."

Thomas Huxley, "Intellectually we stand on a little islet in the midst of an illimitable ocean of inexplicability."

Bertrand Russell, "Most people would sooner die than think. In fact, they do so."

Martin Luther King, "Nothing in the world is more dangerous than sincere ignorance & conscientious stupidity."

Richard Feynman, "We are at the very beginning of time for the human race."

G. C. Lichtenberg: "Perhaps in time the so-called Dark Ages will be thought of as including our own."

Daniel J. Boorstin, "The greatest enemy of knowledge is not ignorance, it is the illusion of knowledge."

Johann von Goethe, "Doubt grows with knowledge."

Johann von Schiller, "With stupidity, the gods themselves struggle in vain."

Shakespeare, Hamlet "There are more things in Heaven & Earth, Horatio, than are dreamt of in your philosophy."

Author, "The more one learns the more one learns how little one knows."

Mort Sahl, "The future lies ahead." #

Electromagnetism Timeline

. This *Electromagnetism Timeline* and the following *Astronomy Timeline* are separate from the main text as they are fields of study somewhat apart from events in the main text relating to religion, science, and philosophy. They are easier to follow and comprehend when their events are shown together. Electromagnetism is the relationship between electricity and magnetism. It is the key to the nature of light and the inner structure and properties of matter. Some important events in this timeline are also the main text.

- 600 BC **Thales of Miletus** rubbed amber (elektron in Greek) with cat fur, made static electricity. First discovery of magnetic rocks has been claimed for several spots. One spot was in Magnesia in Northern Greece
- AD 121 Chinese knew that an iron rod, after being brought near a natural magnet, would acquire and retain the magnetism of the natural magnet, and that such a rod when freely suspended about a vertical axis would set itself approximately in the north-south direction.
- 1269 **Pierre de Maricourt** described magnetic poles. There is never a single pole.
- 1600 **William Gilbert** (1544-1603), physician to the Queen, used the word "electricus" from the Neo-Latin Greek word for amber. He wrote about the attractive force of substances in his *De magnete, magneticisque corporibus et de Magno Magnete Tellure / On the Magnet and Magnetic Bodies, and on the Great Magnet the Earth*. He deduced that was why compass needles pointed north.
He first used the terms electricus force, magnetic pole, and electricus attraction and discussed static electricity. He considered it important that magnets can be cut, each forming a new magnet with north and south poles. He was the first to distinguish between electric and magnetic attraction. He established the science of terrestrial magnetism.
- 1620 **Niccolo Cabeo** (1586-1650), Italian Jesuit, saw that an electrically charged body can attract non-electrified objects and that two charged objects repelled each other.
- 1646 Sir **Thomas Browne** first used the word "electricity" derived from **Gilbert's** 1600 electricus, like amber..
- 1663 **Otto von Guericke** (ref.1650), made a primitive electrostatic generator (a sulphur globe attached an iron rod, which generated a *charged + or -* object). He saw that the electricity could travel along a thread; thus discovered the concept of an electric current.
- 1690 **Christiaan Huygens** (ref 1655, 1905), published his theory that light acted as a wave, not as particles. He developed it in 1678, but didn't not publish it as it differed from **Newton's** particle theory.
Wave theory explained both reflection and refraction and in time became more accepted than **Newton's** particle theory.
- 1729 **Stephen Gray** (1666-1756), Brit, showed that static electricity, a very weak charge, doesn't have to be made in place by rubbing but can also be transferred from place to place with conducting wires.
He also showed that the charge on electrified objects resides on their surfaces.
- 1733 **Francois Du Fay** discovered there were 2 types of charges. Like charges repel. Unlike charges attract.
- 1745 **Georg von Kleist** (1700-48), scientist, jurist, and Lutheran cleric of Pomerania, invented the Kleistian Jar. It could store electricity (a battery). This discovered that electricity was controllable.
- 1745-6 **Pieter van Musschenbroek** (1692-1767), Dutch, a student of **Kleist**, based on **Kleist's** work, improved **Kleist's** jar and named it a Leyden jar, named after the town. It releases all its charge at once.
- 1747 **Ben Franklin** (1706-90) proposed the principle of conservation of charge and called the electricity experimented with a fluid that exists & flows "positive". He also found that electricity could act at a distance.
- 1747 Sir **William Watson** (1715-67) Brit, saw that a discharge of static electricity caused an electric current to flow, This discovered the concept of electrical potential / strength / intensity, now called voltage.
- 1748 **Watson** used an electrostatic machine and a vacuum pump to make the first fluorescent light bulb (an electric current passing through gas). His bulb was a tube three feet long and three inches in diameter.
- 1752 **Benjamin Franklin** (ref. 1747), showed that lightning was electricity. He published *Experiments and Observations on Electricity*; widely read in America and Europe, the first important treatise on electricity. This elected him to the *Royal Society*.

1759 **Francis Ulrich Theodore Aepinus** (1724-1802) German-Russian, showed that electrical effects are a combination of “fluid” flow” confined to matter and action at a distance. He also discovered charging by induction (the process by which an electrical conductor becomes electrified when near a charged body).

1766 **Joseph Priestley**, on **Franklin’s** advice, showed that hollow charged vessels have no charge on the inside. **Henry Cavendish** produced a gas from acid put on certain metals. He exploded this gas mixed with atmospheric air with an electric spark. It created water. So he called the gas *flammable air*; (it’s hydrogen).

Electricity moves muscles 1780 **Luigi Galvani** (1737-98), Italian physician, showed that electricity transmitted signals to muscles by applying electricity to dead frogs’ legs, which then twitched. He then also discovered that twitching can be caused by contact with dissimilar metals, an early study of bioelectricity.. His students posited (incorrectly) an invisible fluid, called “animal electricity” to describe this effect.

1785 **Charles-Augustin de Coulomb** (1736-1806), French military engineer, discovered that “The force of attraction or repulsion (electric or magnetic) exerted on one charged body by another varies by the product of their charges and inversely by the *square* of their separation.” So it’s **Coulomb’s Law**

A *coulomb* is the International System of Units (“SI”) unit of electric charge in the modern form of the metric system. One coulomb per second is one ampere / amp in the SI system, equal to the quantity of electricity conveyed in one second by a current of one ampere, amp.

An amp is the base unit of electric current, named after **Andre Ampere**, One coulomb = one amp per second **Coulomb** showed that an electrical charge is on the surface of a conductor.

Volta battery, First break-through that made electricity a force in society 1800 **Alessandro Volta** (1745-1827) Italian, made the first great breakthrough in transforming electricity from a laboratory toy to a powerful influential force in society by building an improved battery to store electricity. He built a Voltaic pile (a stack of copper and zinc discs, separated by brine-soaked cardboard) which greatly increased the amount of the electric effect. Unlike static electricity, a battery stored electricity and thus provided a steady source of current.

He had seen **Galvani’s** touching a frog’s legs with electricity (1780) and realized that the frog’s legs were both a conductor and detector of electricity. His battery was crude compared to modern batteries but a great advance as it showed that electricity could be made chemically. The *intensity* of an electric charge is now measured in volts, i.e., voltage is analogous to water pressure in a pipe.

Volta invented the phrases “electromotive force” and “electric current.” **Napoleon** made him a count.

1800 **William Herschel** discovered non-visible infrared radiation and deduced that sunlight was electromagnetic waves. (See 1781, ‘85-86 in the main text, and pp. 433-4 in the *Astronomy Timeline*.)

1800 **William Nicholson** (1753-1815), Brit, with **Johann Ritter**, German physicist, discovered electrolysis by passing an electric charge through water, decomposing it into its component elements, hydrogen & oxygen.

1802 **Gian Romagnosi** (1761-1835) Italian, saw an electrostatic charge, not an electric current, could move a magnetic needle. So electricity and magnetism were related. (see 1819-**Oersted**) Thus this field of study is not called Electricity but Electromagnetism. All sub-atomic particles are tiny magnets.

1805 **Luigi Brugnatelli** (1761-1818), Italian chemist, discovered electroplating.

1806 **Volta** (ref. 1800) used his voltaic pile/battery to decompose (separate the elements of a multi-element substance), which most substances are) potash and soda.

This showed that they are oxides (a substance of which one element is oxygen) previously unknown metals, potassium and sodium. This began the scientific field of electrochemistry.

1819 **Hans Christian Ørsted / Oersted** (1770-1851) Danish physicist and chemist, discovered that electric currents create magnetic fields, which was the first connection found between electricity and magnetism. He saw that a compass needle was deflected when near a wire carrying an electric current.

1819 **Andre Ampere** suggested that the magnetic properties of matter were the result of tiny atomic currents, due to the fact that electrons in an atom rotate continuously about an axis passing through it. He saw that two parallel electric wires attract or repel each other depending on which way their electric currents flowed. (Next **Ampere** 1831)

Electricity can cause a magnetic field which **Michael Faraday** (1791-1867), self educated, first a chemist assistant to **Humphry Davy**. Working alone found the flow of an electric current in a wire caused a magnet surrounding that wire to rotate. This showed that electrical forces could produce motion, that is, the current through wires pulled magnets

can cause motion, i.e., a motor. His key breakthrough was the concept of a field around an electric current.

attached to an axle that then rotated. (see 1821 also in the main text).

He built two devices that produced “electromagnetic rotation” (i.e., an electric motor). (see **Oersted** just previous). His key breakthrough was the concept of a *field* around an electric current that pulled magnets around an axle. He saw that the strength of magnetism decreased with distance.

[It decreases by the *square* of the separation, like gravity and light/electromagnetic waves.]

He drew imaginary lines through the magnetic field connecting points of equal intensity, called these *lines of force*. He said the universe consists of fields. His experiments and inventions founded modern electromagnetic technology. Scientists began to study how other forms of energy related.

In 1825, he became Director of the Laboratory of the Royal Institution. (More **Faraday** 1831)

1821 **Humphry Davy** (ref. 1807 in the main text), Brit, chemist showed that direct current is carried throughout the volume of a conductor and resistance is increased as the temperature rises. .

c.1821 **Dominique Francois Arago**, Catalan-French (1786-1853), mathematician, physicist, astronomer, politician, member of the *French Academy of Sciences* at 23, discovered that an iron bar was magnetized when put inside a coil of wire carrying a current, but he did not realize the significance of the increased strength of the resulting field. He showed **Oersted's** (1820) electricity-magnetism connection to the *French Academy*. He also developed the principle of magnetism by rotation.

1825 **William Sturgeon** (1783-1850) Brit, former soldier, invented the electromagnet.

Electro-dynamica

Law of the Mechanical Action Between Currents is the basis of the relationship between magnetic, electrical, & mechanical phenomena;

Andre Ampere (ref 1819) , published his *Law of the Mechanical Action Between Electric Currents*.

James Clerk Maxwell (ref 1855) said that it was one of the most brilliant achievements in science.” The theory “seems as if it had leaped complete from **Ampere** (the **Newton** of Electricity).

“It is perfect in form and unassailable in accuracy; and it is summed up in a formula from which all the phenomena may be deduced, and which must always remain the cardinal formula of electro-dynamics.”.

Ampere had discovered the mutual influence of electric currents.” In 1819 he had seen that two parallel electric wires attract or repel each other depending on which way their electric currents flowed. He showed that a wire with electricity going thru it produces a *magnetic* field around it.

The *magnetic field* caused by a charged molecular current is proportional to the electric current that creates it, just as the *electric field* in space is proportional to the charge that creates it. So **Ampere's Law** is the basis of the study of the relationship between magnetic, electrical, and mechanical phenomena, *electrodynamics*. He showed how to make a magnet.

The ampere / amp is the base unit of amount of electricity going through a wire.

1826
 $V = IR$
 $I = V / R$
 $R = V / I$
are all the same formula

Georg Simon Ohm (1789-1854), German, established the direct proportionality between the *amount* of electricity/current in a wire(amp) and the potential difference between its terminals (now known as **Ohm's law**). (Voltage “V” is pressure) (“I” is number of amps) and (“R” is resistance).

They are expressed in a formula three ways: $V=I R$ or $I=V / R$ or $R=V / I$. R is the electrical *resistance* (measured in *ohms*) between two points of a conductor of electricity (like the filament in a light bulb. The resistance of a filament or wire is one ohm if the potential difference between the terminals of the conductor when the current in the conductor is one ampere.

$R= V / I$. The resistance of one volt per ampere is called one ohm. The *amount* (amps, “I”) of electricity passing through a conductor is voltage divided by resistance. $I = V / R$.

The importance of **Ohm's** idea was that voltage (pressure) was the driver of electric current. In his scheme, temperature and voltage correspond as do heat flow and electrical current.

1829 **Francesco Zantedeschi** (1797-1873), Italian: A magnet nearing or leaving a closed circuit causes a current.

Electricity can cause and be caused by motion

1831 **Faraday** (ref. 1821) returned to his electrical work at the Royal Institution and showed that changing currents in one circuit induced currents in a neighboring circuit.

After hundreds of experiments, he showed that they can all be explained by the idea of changing magnetic flux. No math, just picture thinking using his field-lines. He produced electricity by pushing and pulling a magnet through an insulated wire wrapped around a paper cylinder.

It made an electric current in the wire. This is *electromagnetic induction* (adding or subtracting electrons to a body), the foundation of electric motor technology. He said that a magnetic field is composed of *lines of force* and the insight that electrical and magnetic actions are not transmitted instantaneously. He then built the first electric generator. It was a 16 inch copper disc that spins between the poles of a large magnet. This creates an electric current.

Faraday also showed that magnetism could affect light and proved that vibrations of metal could

be converted into electrical impulses, crucial for the telephone. He helped create the concept of energy.

A type of energy can change, i.e., light (or other type of energy) to heat, etc, but the total amount of energy remains the same. This became the *Law of Conservation of Energy* (also *The Second law of Thermodynamics* says that in converting one type of energy to another (except conversion to heat) some energy is lost into the sink of space and becomes unusable energy. It is called entropy. (more 1833)

1832 Baron **Pavel von Schilling** (1786-1837) Estonian-Russian, made the first electromagnetic telegraph, using a binary system of signal transmission.

1832 **Hippolyte Pixii** (1808-35), French, improved **Faraday's** electric generator, & developed alternating current.

1833 **Heinrich Fredrich Emil Lenz** (1804-65), born in Estonia, discovered that "An induced current in a closed conducting loop will appear in the direction that opposes the change that produced it."

This discovered how to determine the direction of **Faraday's** induced currents. They flow in such a direction as to produce magnetic forces that try to keep the magnetic flux the same.

If you try to push a conductor into a strong magnetic field, it will be repelled. If you try to pull a conductor out of a strong magnetic field, the magnetic forces on the induced currents will oppose the pull.

This phenomenon was then called **Lenz's Law**. **Lenz's** law is a common way of seeing how electromagnetic currents obey **Newton's Third law** (for any action, there's an equal and opposite reaction.)

1833 **Faraday** (ref. 1821, '31) (Recall, he was first a chemist assistant to **Humphry Davy**) related electricity to chemistry. After many experiments, he decided, "Each atom of matter has a certain absolute quantity of electric power." **Faraday** became professor of chemistry at the Royal Institution.

He worked to develop optical glass for the Admiralty. (more **Faraday** 1834, '38, '45, '54)

1835 **Joseph Henry** (1787–1878), American physicist, from working-class parents, apprenticed first to a watchmaker at 13, designed better electromagnets, so an electric current could rotate a wheel better. That is, he improved the electric motor. With **Faraday**, he saw how to make an induced current.

He discovered the principle underlying an electromagnetic telegraph. He invented low and high resistance galvanometers. He discovered the oscillatory nature of electric discharge.

(In 1846, **Henry** was named secretary and director of the US Smithsonian Institution.)

1837 **William Cooke** and **Charles Wheatstone** (1802-75), Brits, patented and demonstrated a telegraph using two wires. It eventually was used by British railroads and then by the British general public.

1837 **Samuel Morse** (1789-1872) American, patented a one-wire telegraph, invented **Morse** code, sent first telegram in 1838. It was used by American railroads and then was used by continental European countries.

1838 **Faraday** (ref. 1821, '31, '33) discovered cathode rays (streams of electrons observed in discharge tubes) using **Volta's** battery. He showed that the effects of induced electricity in insulators are analogous to induced magnetism in magnetic materials. He also saw a dark region in a glow discharge near the negative electrode (called **Faraday's** dark space).(more **Faraday** 1845, '54)

1839 **Rudolf Kohlrausch** German, said an electrolyte (a fluid that conducts electricity, like salt water or acid) has a specific constant amount of electrical resistance.

1839 **Alexandre Becquerel** (1788-1878), French, saw the photoelectric effect with an electrode in an electric conductive solution exposed to light.

1841-43 **James Prescott Joule** (1818-89) Brit, brewer, showed that energy is conserved in electrical circuits involving current flow, thermal heating, and chemical transformations. He discovered that the heat which is evolved by the proper action of any voltaic current is proportional to the square of the intensity of that current, multiplied by the resistance to conduction which it experiences (this is **Joule's first law**) This led to the *law of the conservation of energy* (1831-**Faraday**) which led to *the first law of thermodynamics*.

1845 **Faraday** (ref. 1821, '31, '33, '38) discovered that the plane of polarization of light is rotated when it travels in glass along the direction of the magnetic lines of force produced by an electromagnet (**Faraday rotation**). "Fields" began to take on an existence of their own with the development of electromagnetism **Faraday** coined the English term "field".

He introduced fields as properties of space (even when it is devoid of matter) having physical effects. He argued against **Newton's** "action at a distance", and proposed that interactions between objects occur via space-filling "lines of force". This description of fields remains to this day.

In 1846, after discovering the magnetic rotation of light, said that light might be electromagnetic.

1847 **Wilhelm Weber** (1804–91) German, proposed that *diamagnetism* (the property of materials that are *repelled* by a magnetic field) is just **Faraday's** law acting on molecular circuits.

To answer the objection that this would mean that everything should be diamagnetic, he correctly guessed that diamagnetism is masked in paramagnetic and ferromagnetic materials because they have relatively strong permanent molecular currents. (Paramagnetism is a form of magnetism whereby some materials are weakly attracted by an externally applied magnetic field, and form internal, induced magnetic fields in the direction of the applied magnetic field.

This work destroyed the concept of magnetic fluids. (See 1856-**Kohlrausch**)

1851 **William Thomson** (ref. 1843, '46, '48, '53, '67, '92) Scot, taught a general theory of thermoelectric phenomena.

1853 **Thomson** derived the correct formula for magnetic energy. (He was named Lord **Kelvin** in 1892)

1855 **James Clerk-Maxwell** (1831-79) Scot, published *On Faraday's Lines of Force*, (ref. 1831) saw the lines could be put into mathematical equations. He did so. **Faraday** thanked him.

Light *Lines of Force* showed how electricity and magnetism were related. He also showed that white light would result combining red, green, and blue lights.

1856 **Kohlrausch** (ref. 1833) and **Wilhelm Weber** (ref. 1847), showed that the ratio of electrostatic to electromagnetic units produced a number that matched the value of the then known speed of light.

Light This finding was instrumental towards **Maxwell's** 1862 notion that sunlight is an electromagnetic wave.

1857 **Gustav Kirchhoff** (ref. 1859-Physics in the main text) was first to discover that electromagnetic waves travel at the speed of light (as light is also electromagnetic waves with different wave lengths.).

c.1860 **Johann Geissler** (1804-70), German, made gas in a tube glow from an electric current. Thus discovered a (florescent light). Also Sir **Joseph Swan** had passed a current through a carbon filament in an evacuated tube. It glowed but was not commercially viable.)

1861 **Philip Reis** (1834-74), German, made a crude telephone. It changed *musical* sounds to electricity & back.

1861-62 **Maxwell** (ref. 1855) published a mechanical model of the electromagnetic field. This addition completed **Maxwell's** equations and it was now easy for him to derive the wave equation and to note that the speed of wave propagation was close to the measured speed of light.

Sunlight is a group of frequencies of the electromagnetic spectrum

He then inferred that light goes in the same medium that causes electric and magnetic phenomena. He then made a conceptual model for electromagnetic induction. He published *On Physical Lines of Force*. It reduced all knowledge of electricity to 20 linked differential equations.

In other words, based on work of **Faraday**, he said that light and electromagnetic radiation went at about the same speed, so light travels in the same medium as electricity, so concluded that light was a form of electromagnetic radiation. (See 1867) (**Maxwell** also made the first color photos.)

1863 France built a practical fax line on the telegraph line from Paris to Lyon. In 1867 extended it to Marseilles.

1864 **Maxwell** (ref 1855, '61) showed his equations to the *Royal Society*. Electric waves could act at a distance.

1865 **Ezra Newman** and others solved the **Clerk-Maxwell** field equations for charged rotating systems.

1866 *The Great Eastern* (ref. 1858 in the main text) laid the first successful telegraph cable across the Atlantic. **William Thomson** was on board. He invented booster devises enabling the cable to transmit.

1866 **Charles Wheatstone** (ref 1837) and **Samuel Alfred Varney**, Brits, and **Ernst Werner Siemens**, German, independently developed the first practical dynamos (a device to convert mechanical power into electricity (by setting conductors, usually coils of copper wire, to rotate in a magnetic field.) It was patented in 1866.

1867 January, **Wheatstone** and **Siemens** announced their dynamos. (So now a car's *generator* and starter motor is one device. How? Direct current from the car's battery creates a magnetic field around a coil around the axle of the device, making the coil rotate, which mechanically moves the pistons go up and down, with some electricity going to spark plugs which ignites the gas-air mixture in the pistons, which starts the car's fuel engine. The engine, when then running based on fuel exploding in the pistons, rotates the device that then generates electricity that is put back into the car's battery).

All generation of electricity (except solar cells) is based on rotating a coil surrounded by a magnet.

1867 **Ludvig Lorenz** (1829-1891) Danish physicist, explained the transmission of forces through fields

using differential equations. He demonstrated that electrical forces went at the speed of light. He developed an electromagnetic theory of light. He did not agree to **Maxwell's** incorrect view that light involves electromagnetic waves in the *aether*. (*Aether* was still a live concept at the time.)

He felt, rather, that the fundamental basis of all luminous vibrations was electric currents, arguing that space had enough matter in it to support the necessary currents.

The **Lorenz** gauge of electromagnetism is named for him. (Don't confuse with **Lorentz**, 1895)

- 1867 **Maxwell's** (ref. 1855, '61, '64) *A Dynamical Theory of the Electromagnetic Field* said, "Light and magnetism are variations of the same substance, electromagnetic waves, so light [travels] like all electromagnetic waves." Using **Faraday's** ideas, he unified magnetism with electricity. He said that that electricity, light, & magnetism, were all electromagnetic waves of different wavelengths traveling at 310,740 Kps.(4% high) He showed their speed was the combination of an electrical "constant" and a magnetic "constant."

Electro-magnetic fields

He introduced "electromagnetic fields" to replace **Faraday's** force fields. He measured microwaves, then shorter infrared waves, then visible light waves ultraviolet, then X-rays, then the shortest and most energetic waves, gamma rays. [Gamma rays, X-rays, and ultraviolet high energy photons can break chemical bonds and damage cells.]

Maxwell said that visible light constituted a tiny part of the electromagnetic spectrum, and acts as a wave. (**Huygens's** 1678 idea). This pretty much did in **Newton's** theory that light was particles.

Maxwell said that a change in a magnetic field creates an electric force, and vice versa. Change in an electrical field creates a magnetic force. **Maxwell** predicted that longer electromagnetic waves existed (**Heinrich Hertz** confirmed this in 1887 when he discovered radio waves. (See 1887 **Hertz**)

- 1871 **Antonio Meucci** (1808-89), Italian American, got a preliminary US patent for an electric telephone, *teletrofono*.

- 1873 **Maxwell** (ref.1855, '61, '67) published *Treatise on Electricity and Magnetism*. It summed up all electricity. It told all about electricity and magnetism and their unity. The electromagnetic potential was the center of his theory. His equations were a quantitative expression that linked the fundamentals of electrostatic electromagnetism with the speed of light. The ideas in *Treatise* were not **Maxwell's**. He put **Faraday**, **Ampere**, & **Oersted's** ideas in mathematical form. (They were improved and simplified in 1881. (See 1881)

Maxwell's equations

Maxwell's equations describe how electric and magnetic fields are generated and altered by each other and by charges and currents. The theoretical implications of electromagnetism, in particular establishing the speed of light based on properties of the "medium" of propagation (permeability and permittivity), led to **Einstein** developing special relativity in 1905.

Einstein explained

Einstein in 1938 said that **Maxwell** and **Faraday's** work was "the first fundamental advance in theoretical physics since **Newton**." He summarized **Maxwell's** significance, "Classical mechanics referred all phenomena, electrical as well as mechanical, to the direct action of particles on one another, The simplest laws of this kind are **Newton's** laws of motion."

Einstein explained

"**Faraday and Maxwell** introduced an entirely new kind of physical reality, namely a *field* of force which introduced a new type of law, laws of *fields*, not of *matter*. Introducing these new realities gave the enormous advantage that, first, the concept of action at a distance, contrary to our ordinary experience, is made unnecessary inasmuch as the fields are superimposed in space from point to point without a break. In the second place, the laws for the field, especially in the case of electricity, assume a much simpler form than if no field is assumed, and if only masses and motions are regarded as realities. Fields are now the fundamental qualities.

A field of force

Einstein explained

"What made [**Maxwell's**] theories revolutionary was the transition from *forces* acting at a distance to *fields* as fundamental quantities.

The incorporation of optics into electromagnetic theory, with its connection between the speed of light and the absolute electrostatic and electromagnetic systems of units, as well as the relation of the *Index of refraction* to the dielectric constant, and the qualitative connection between the reflection coefficient and the metallic conductivity of a body-it was like a revelation."

(**Newton** also described his concept and law of gravity, which was a *force* acting at a distance.)

- Feynman** **Richard Feynman** later said that in the long run, **Maxwell's** discoveries will be judged the most significant [scientific] event of the 19th century. (i.e., surpassing **Darwin's** evolution).

Maxwell's electromagnetic waves were not immediately generally accepted as they were new and unproven. It was 25 years before **Heinrich Hertz** (1887) proved them.

1876 **Alexander Graham Bell** (1847-1922), born in Edinburgh, his mother and wife were deaf, amateur scientist, opened a school for the deaf in Boston in 1872, devised devices to help deaf people, patented an "improvement on telephony" crediting **Reis's** and **Meucci's** prior work. The telephone was a minor part of his life; he didn't have one in his house. He was a founder of the National Geographic Society.

1877 **Emile Berliner** (1851-1929) Austrian born American inventor, made an iron diaphragm transmitter and added an induction coil to the loose-contact transmitter, making a transformer that amplified electronic waves and prevented transmissions from fading. This enabled **Bell's** telephone to work.

1878 **Bell** (ref. 1876 above) bought **Berliner's** device for \$50,000, a fortune, made him chief engineer of the **Bell Telephone Co.** It then sold telephones as the **Bell-Berliner** telephone.

1879 **Thomas Edison** (ref. 1883 in the main text) created the first modern industrial laboratory with numerous engineers and electricians. He and his lab invented the phonograph (made him famous), printing telegraph, alkaline battery, mimeograph, kinoscope (a motion picture device), and c. 1,300 other electrical inventions.

The key to a practical incandescent bulb was to find the best filament

The *concept* of an electric light (electricity flowing through a filament that glowed) was well known but a good filament was needed. **Edison's** men, after many experiments, found that a carbonized bamboo filament worked best. They thus *improved*- not invented -the incandescent bulb. It was the best for 29 years.

Important inventions, like light bulbs, steam engine, auto, computer, airplane, electric motor, telephone, are of little value until they become part of a *system*. So don't think invention, think *system*.

1879 **Siemens GmbH**, German, showed the first electric railway, and in 1881 the first electric tram system.

1879 **Maxwell** published **Cavendish's** (ref. 1783, '98) 1766 discovery that the attraction or repulsion of two small electrically charged bodies varied directly as the product of their charges and inversely by the square of their separation. This discovery entered the body of knowledge only after his death when **Faraday** read **Cavendish's** notes and gave them to **Maxwell**, who published it. **Cavendish** also discovered the concept of capacitance (the ability of a circuit or object to store an electric charge) and resistance. He didn't measure current other than note the level of personal discomfort.

1881 **Oliver Heaviside** (1850-1925), Brit, replaced and simplified **Maxwell's** 20 "force fields" equations (the heart of electromagnetism) into 4 differential equations, now called "**Maxwell's Equations**" or **Maxwell's Laws**. They were discovered by others, but **Maxwell** realized that they (with **Lorentz's** force law) were the heart of the theory of electricity and magnetism.

Maxwell's equations simplified & explained

The heart of the theory of electricity and magnetism

The *meanings* of the four differential equations (in simplified terms) are:

1. The shape and strength of the electric *field* is given if we know where in space the electric charges producing it are. The electric *field* emanating from an electric charge varies by the charge (**Gauss**). (A separate **Lorentz** (1892) *force law* was included in the original equations by **Maxwell**, but no longer.)

2. A magnetic *field* exists between the poles of a magnet. (There are no single magnetic poles. The plus pole and the negative pole are of equal strength.) As the world is a magnet, it has a north magnetic pole and a South magnetic pole.

Such poles are close to but not *at* the geographic rotational North and South poles. A compass detects the world's magnetic *field* and points to a magnetic pole, not the geographic pole.

3. A compass gives the strength and direction of the electric *field* at any given point. The total magnetic flux piercing a closed surface is zero. The *magnetic flux* through a surface is the surface of the normal component of the magnetic *field* passing through that surface.

4. The magnetic flux passing through a surface, in a simplified picture, is proportional to the net number of field lines passing through that surface. (**Gauss's law** for magnetism.)

Equations 1 and 2 explain *static* electric and magnetic fields, i.e., *fields* without a current or a changing current. Equations 3 and 4: Magnetic *fields* are not only produced by electric currents but are produced by *changing* electric *fields*. So equations 3 and 4 mean that propagating electric *fields* and magnetic *fields* cannot be separated as each produces the other.

From this, he inferred that invisible energy waves (now called electromagnetic radiation), have a spectrum of waves of different frequencies, including visible light frequencies.

Electromagnetic waves have three characteristics, *frequency*, *speed*, and *wave length*.

Frequency is how many waves pass a point every second.

Speed, All electromagnetic waves / wave crests go 186,282 miles per second. (299,792+Kps) (7.75 times around the earth at the equator)

Wave length is the distance between wave crests. It depends on the frequency; the higher the

frequency, the shorter the wave length. *Radio* wave crests range from thousands of miles to a few yards.

Then shorter waves than radio waves are microwaves, then infrared waves, then visible light waves, then X-rays (ultraviolet and Gamma rays, the shortest and most energetic waves).

1881 **Helmholtz** (ref. 1847, '51): German, set out to verify **Maxwell's** equations with his pupil **Heinrich Hertz** (see 1887). The idea of charged particles in atoms can be consistent with **Maxwell's** and **Faraday's** ideas, helping to pave the way for the modern concept of particles and fields interacting.

1882 **Thomas Edison** (ref.1879) put into operation a *direct-current* electric distribution system in NYC with 59 customers. But direct current didn't work well. The company failed. (See 1887-**Tesla** & 1892-**Edison**)

1884 **John Poynting**: **Maxwell's** equations predict that energy flows through empty space with the energy flux.

1887 **Heinrich Hertz** (1857-1894), German, (a student of **Helmholtz**) showed experimentally that an oscillating electric current produced waves that spread through the space at the speed of light, radio waves.

He invented a device to make and receive such electromagnetic radio waves.

Hertz first to conclusively prove the existence of electromagnetic waves
He also measured the length and velocity of the **Maxwell's** electromagnetic waves and showed that they could be reflected, refracted, and polarized like light.

Hertz was the first to conclusively prove the existence of electromagnetic waves predicted by **Maxwell's** 1867 equations of electromagnetism that said that longer waves existed. Such longer radio waves, *Hertzian waves*, and, like all electromagnetic and light waves, travel through space and metal at the same speed. His discoveries led to the wireless telegraph.

[Radio and lower frequency waves are non-ionizing radiation.] The *frequency* of electromagnetic waves is how many wave crests pass a point each second. **Hertz's** work was the first demonstration of the finite propagation of a supposed action at a distance. His work led to investigation of the photoelectric effect. **Hertz's** experiments caused physicists to change their views about electromagnetism from "instantaneous action at a distance."

Tesla Nikola Tesla (1856-1943), Serbian-American, built an *alternating-current* ("AC") induction motor

1887 with no solid connection to the rotating part, making it more reliable than **Edison's** *direct-current* ("DC") system. It used polyphase [more than one phase] current which generated a rotating magnetic field that did not need a commutator. It was self starting. It could only rotate at a

1888 constant speed. In 1888, **Tesla** patented his AC motor, licensed it to **Westinghouse**. AC transmits current long distances far more efficiently than DC, thus far cheaper, than **Edison's** DC system. .

1888-9 **Hertz** (ref. 1887) discovered that oscillating sparks can be produced in an open secondary circuit if the frequency of the primary circuit is resonant with the secondary circuit. He used this to show that electrical signals are propagated along wires and through the air at about the same speed. In 1889, he described the theory of radiation from his oscillating spark gap.

1889 **Joseph John (J J) Thomson** (1856-1940) verified **John Canton's** 1762 effect that a red hot poker neutralizes the electrification of a small charged body.
How? Electron emission causes the air between the poker and the body to become conducting.

1890-92 AEG GmbH, German, developed **Tesla's** AC motor and generator, so power-plants could be built.

Tesla
Tesla's (ref.1887, '88) inventions were crucial to the development of electricity. He even showed *wireless* transmission of electricity was *possible* but *impractical* (the **Tesla** effect). After bitter, expensive, dishonest, protracted lawsuits and false publicity by **Edison**, **Tesla's** better AC became the worldwide standard for electric motors and distribution systems. In 1896, he studied x-rays.

1891 **Sebastian Ferranti** (1863-1930), Brit, built an AC power generating station and distribution system.

1892 **Edison's** (ref. 1877 and 1887) DC electric distribution company was inferior to **Tesla's** AC system companies, so **Edison's** company was sold to a successful AC company and discarded.

1892 **Hendrik Lorentz** (ref. 1895, 1905-6 in the main text) presented an electron theory of electrified matter and aether. It combined **Maxwell's** equations, with the source terms and with his **Lorentz's** force law for the acceleration of charged particles: He also developed what we now call the **Drude-Lorentz** harmonic oscillator model of the *Index* of refraction. But **Lorentz's** theory had a "stationary aether", which conflicted with the negative **Michelson-Morley** result. (More **Lorentz** 1904).

1892 **George FitzGerald** (1851-1901), Irish, proposed length contraction as a way to reconcile **Lorentz's**

- theory and the null results on the motion of the earth through aether. **Lorentz** endorsed this idea.
- 1893 **Charles Steinmetz** (1865-1923), Prussian-German, short, deformed, the father of electrical engineering, improved AC circuitry letting scientists design better AC equipment.
- 1895 **Wilhelm Roentgen** (1845-1923), German, made and detected X-rays, an electromagnetic wave, the birth of nuclear physics.
- 1895 **Guiglielmo Marconi** (1874-1937), Italian, followed **Hertz's** experiments. He believed that electromagnetic waves could be used to transmit messages.. He made a device where the spark gap was connected between an elevated wire (in effect, an aerial) and the Earth. His receiver was 9 meters away. It worked. He and **Alexandr Popov** saw long wire antennas greatly increased the range of wireless waves.. He increase the distance of his transmitter to his receiver gradually to three kilometers.
- 1901 **Marconi**, in St. John's, Newfoundland, using **Tesla** devices, picked up the first transatlantic signal, the **Morse** code letter "s" radio signal, transmitted 2,000 miles from Cornwall, England.
- 1904 **Lorentz** (ref. 1892) discovered an electron-collision theory of electrical conduction.
- 1904 **John Ambrose Fleming** (1849-1945), Brit, electrical engineer, invented the two-electrode radio rectifier; or vacuum diode, the first electronic vacuum tube, which had practical use in early radio receivers. The valve reliably detected radio waves.
- 1905 **Einstein** posited his *Theory of Special Relativity*. **Einstein** explained the photoelectric effect by extending **Planck's** idea of light quanta, or photons, to the absorption & emission of photo-electrons. (also main text)
- 1906 **Reginald Fessenden** (1866-1933), Canadian American, the "father of voice radio", transmitted a voice and music program in Massachusetts. It was picked up as far away as Virginia.
- 1906 **Lee De Forest**, American, improving **Fleming's** invention, put a third wire, or grid, into a vacuum tube, creating a sensitive receiver. Particular inventions often need improving to become commercially viable.
- 1911 **Heike Kamerlingh Onnes** discovered superconductivity. He was studying the resistivity of solid mercury at cryogenic temperatures using the recently discovered liquid helium as a refrigerant. At the extremely cold temperature of 4.2 **Kelvin**, he observed that the resistivity abruptly disappeared.
- 1912 **Edwin Howard Armstrong** devised a regenerative circuit for the triode that amplified radio signals. By raising the current, he also discovered the key to continuous-wave transmission, which became the basis for amplitude modulation (AM) radio.
- 1913 **Robert Millikan** measured the electric charge on a single electron.
- 1915 **Einstein** and many other scientists sought to combine the two field-producing causes (a magnet and an electric current) into one theory. (See main text at 1915).
- 1917 **Armstrong** (ref. 1912), in the U.S. Army Signal Corps invented the superheterodyne circuit, an eight-tube receiver that dramatically improved the reception of radio signals.
- 1920 Radio station KDKA in Pittsburgh became radio's first scheduled commercial programmer.
- 1925 **John Logie Baird**, Scot, successfully transmitted the first recognizable television image. In 1927, he showed that his television system could produce images in crude color
- Charles F. Jenkins** pioneered his mechanical wireless television system, with a public transmission sent from a navy radio station across the Anacostia River to his office in downtown Washington DC.
- 1926 **Max Born** (1882-1970) German, argued that the electromagnetic wave corresponding to a particle was a wave of probabilities; it was a representation of the state of the particle. Unlike a particle, a wave can be in several places at the same time. Physicists in the 1920s saw that one can't know accurately and completely how particles within atoms worked. This required a different view of reality. (Nobel 1954)
- 1927 **Philo Farnsworth** at 21 with his all-electronic TV system, transmitted images of a piece of glass painted black, with a line scratched into the paint. He used a cathode-ray tube to transmit and receive.
- 1929 **Vladimir Zworykin**, Russian-American, demonstrated the newest version of his iconoscope, a cathode-ray- based television camera that scanned images electronically, and a cathode-ray tube receiver called the kinescope. The iconoscope, first developed in 1923, was similar to

Farnsworth's "image dissector" camera tube invention.

1932 **Karl Jansky** (Bell Labs) detected radio waves coming from the Sun and from stars all over the universe. This was the birth of radio astronomy which detects stars /galaxies beyond the vision of telescopes.

1933 **Edwin Armstrong** (ref.1912, '17) developed frequency modulation, or FM, radio waves.

1940-45 During World War 2, many efforts were expended in the electronic location of enemy targets and aircraft. These included radio beam guidance of bombers, electronic counter measures, early radar systems.

The first electronic computers were also developed 1940–1945. These were the size of a large room, consuming as much power as several hundred modern personal computers (PCs).

Modern computers based on integrated circuits are millions to billions of time smaller and better.

1947 **John Bardeen** and **Walter Houser Brattain** at Bell Labs invented the first working transistor, a point-contact transistor **William Shockley** then in 1948 invented a bipolar junction transistor.

1953 The National TV System Committee adopted RCA's new system for commercial color TV.

1954 January 1, The Tournament of Roses in Pasadena, was the first coast-to-coast color TV transmission.

1957 **Carl Frosch** and **Lincoln Derick** were able to manufacture the first planar silicon dioxide field effect transistors at Bell Labs, the MOSFET. It was first truly compact transistor that could be miniaturized and mass produced for a wide range of uses. It revolutionized the electronics industry, becoming the most widely used electronic device in the world.] The MOSFET is the basic element in most modern electronic equipment. MOS technology enabled **Moore's law** (Transistors double capacity every two years).

1958 **Jack Kilby** at Texas Instruments invented the first integrated circuits, the hybrid integrated circuit.

1959 **Robert Noyce** at Fairchild Semiconductor invented the first monolithic integrated circuit chip,

1960 **Theodore Maiman** produced the first working laser (Light Amplification by Stimulated Emission of Radiation), based on work of **Charles H Townes**.
Laser

1962 NASA launched the communications satellite Telstar 1. It transmitted the first live transatlantic telecast as well as telephone and data signals.

1962 **Fred Heiman** and **Steven Hofstein** at RCA Labs built the earliest experimental MOS IC chip.

1964 MOS chips had reached higher density lower manufacturing costs than bipolar chips.

MOS chips further increased in complexity at a rate predicted by **Moore's law**, leading to large-scale integration (LSI) with hundreds of transistors on a single MOS chip by the late 1960s.

The application of MOS LSI chips to computing was the basis for the first microprocessors, as engineers began recognizing that a complete computer processor could be contained on a single MOS LSI chip.

1668 **Federico Faggin** at Fairchild developed Silicon-gate MOS technology Since then, the mass-production of silicon MOSFETs and MOS integrated circuit chips, along with continuous MOSFET scaling miniaturization at an exponential pace has led to revolutionary changes in technology, economy, culture, and thinking.

1969 **Marcion Hoff** conceived a single chip microprocessor His concept was part of an order by Japanese company Busicom for a low price desktop programmable electronic calculator,

The first single-chip microprocessor was the Intel 4004, released on a single MOS LSI chip in 1971.

1971 **Federico Faggin** designed Intel 4004, first commercially available microprocessor. This ignited the development of the personal computer

1973 The Intel 8080, an 8-bit processor, made possible to build the first personal computer, the MITS Altair 8800.

1975 The first PC was announced to the general public on the cover of Popular Electronics.

Television was not *invented*. It was *developed*, piece by piece, concept by concept, improvement by improvement, by, *inter alia*, **Paul Nipkow**, German, **Charles Francis Jenkins**, American, **John Logie Baird**, British, **A Campbell Swinton**, British, **Karl F Braun**, German, **Philo T Farnsworth**, American, **Vladimir K Zworykin**, Russian, **Boris Rosing**, Russian, AT&T, **Manfred von Ardenne**, German, Electric and Musical Industries (EMI), British, **Isaac Schoenberg**, and **Edward G Ramberg**, Americans.

The 20th century produced numerous more electrical advances than are named here.

Astronomy /Cosmology Knowledge and Beliefs of the Universe

Creation myths

David Leeming's *Encyclopedia of Creation Myths* describes over 120 creation myths apart from the Jewish stories in *Genesis*.

- 5,000 BC Mesopotamians posited a flat circular Earth enclosed in a cosmic ocean floats in infinite "waters of Chaos"
- 3,000 BC Babylonians: a flat circular earth floats in infinite waters of Chaos with a dome to keep out the Chaos.
- 2,136 BC Chinese astronomers recorded a solar eclipse.
- 2,000 BC Hindu *Rig-Veda*: The universe is infinite in time and cyclical. This cycle of the universe is 8 billion years old.
- c750 BC Babylonians: discovered the 18.6 year cycle of the moon; made movement tables for the Sun and the Moon.
- c586 BC *Hebrew Bible, Genesis*, In the beginning, God created, etc., in 6 days, etc. *Genesis 1:6-7*, The firmament is surrounded by water, the Earth is flat, and there's water above the sky (based on Babylon myths).
- c515 BC **Parmenides**: Universe is finite and spherical unchanging uniform perfect necessary, timeless.
Greeks: Night sky is a shield with pinpricks of celestial light shining thru.
- c500 BC **Pythagoras** said Earth is the center of everything, the Sun and planets revolve around it following certain orbits. He correctly said the Earth is a sphere (after seeing the Earth's shadow during a lunar eclipse).
- c.450 BC **Philolaus**, a Pythagorean, suggested that the Earth orbited the Sun.
Anaxagoras. It's an atomist universe with an infinite number of atoms & an infinite void. There are no **gods**.
- 300 BC **Plato**: The Sun, Moon, and stars orbit the Earth in perfect circles. The Sun is the greatest planet.
- c.387 BC Babylonians saw a bright band of stars around the Earth, called it the galaxias kýklos / Milky Circle.
- 380 BC **Eudoxus** describes constellations in his *Phaenomena* catalog
- 370 BC **Heraclides** is credited with saying the Earth rotated, suggested that Venus and Mars orbit the Sun.
- 350 BC Stoic's Universe: The cosmos is finite and surrounded by an infinite void. It pulsates in size.
Aristotle: Earth is the center of universe, finite in extent, infinite in time surrounded by spheres.
- 270 BC **Aristarchus**: Earth rotates and orbits the Sun. He estimated the Earth-Sun distance and Moon's diameter.
- c250 BC **Archimedes** estimated the diameter of the cosmos as what would now be known as two light years.
- 240 BC **Eratosthenes** using shadows calculated Earth's diameter at 7,940 miles. (It's 7,926 & tilted relative to the Sun.)
- 164 BC Babylonians recorded a comet later called **Halley's**.
- 146 BC **Hipparchus** made the first accurate star map, with 850+ stars, used parallax to calculate Earth-Moon distance at 380,000 km. **Seleucus**: Earth rotates and orbits the Sun. Tides are caused by the Moon.
- 134 BC **Hipparchus** discovered the procession of the equinoxes.
- AD 140 **Ptolemy** published a star catalog. Said the Sun, Moon, and stars orbit the Earth, in circular orbits.
- AD 400 Hindu *Surya Siddhanta*: A year is 365.256 days, just c.1.4 seconds longer than current thinking.
- AD 499 **Aryabhata**: Planets rotate and orbit Sun in ellipses, reflect Sunlight. Earth's diameter is 13,38km. 5% high
- c500 **Agamas**, a Jain, Universe is cyclical, eternal, and finite. The universe is uncreated, existing since infinity.
- 628 **Brahmagupta** showed methods to calculate planets' motions; said gravity was a force of attraction.
- 830 **Al-Khwarizmi** wrote tables of the movements of the Sun, Moon, and the 5 planets, based on geocentrism.
- 850 **Al-Farghani's** *Kitab fi Jawani*, a compendium of the Science of Stars. It corrected some **Ptolemy** mistakes.
- 964 **Al-Sufi** saw a fuzzy cloud in the Andromeda constellation & the Magellanic Cloud, wrote *Book of Fixed Stars*.
- 1000 **Ibn Yunus**, Egyptian, made astronomical observations with an astrolabe 1.4 meters large,
so precise that 19th century astronomers relied on them.
- 1010 **Avicenna**: The universe emanates from God, the eternal unmoved mover.
- c.1020 **Al-Haytham** wrote *al-Shuku ala Batlamyus* / Doubts on **Ptolemy**. It accepted **Ptolemy's** geocentrism
- 1031 **Abu Said Sinjari** suggested the Sun was the center of the universe, heliocentrism.
- c.1040 **Abu al-Rahan al-Biruni** observed and wrote about a solar eclipse.
- 1054 Chinese astronomers saw a bright star, later determined to be the Crab supernova exploding.
- 1070 **Abu Ubayd al-Juzani's** *Tarik al-Aflak* indicated the equant problem of **Ptolemy's** concept of the planets.
- c.1100 Western Medieval world view: Christian God created the cosmos in 6 days in its present form just c.4000 BC.
Earth is the center of the cosmos; all planets and stars orbit Earth in circular orbits; Earth is essentially flat.
Earth's physical laws don't necessarily apply to heaven; Humans were created last and rule everything.

- c.1180 **Fakhr al-din al-Razi** rejected **Aristotle's** geocentrism, said the universe had more than a million worlds.
- c.1250 **Qutb al-Din al-Shirazi**, Heliocentrism is possible.
- 1250 **Nahmanides** suggested the universe is expanding and there are 10 dimensions.
- 1320 **ibn al-Jawziyyah**: The Milky Way is a myriad of tiny stars packed together in the sphere of the fixed stars.
- 1444 **Nicholas of Keus**: Universe may be vast; The Earth may not be the center of the universe.
- c.1450 **Ali Qushji** gave empirical evidence that the Earth rotates. He rejected geocentrism.
- 1514 **Nicolas Copernicus's** *Commentariolus*, given to friends & colleagues, said Earth and planets orbit the Sun.
- 1540 **Rhaeticus**, a student of **Copernicus**, printed an explanation of **Copernicus's** not yet printed *Revolutions*.
- 1543 **Copernicus's** *De revolutionibus orbium coelestium* said planets (inc. Earth) orbit the Sun in circular orbits.
- 1572 **Tycho Brahe** saw a new star, a supernova, in Cassiopea constellation. Showed the heavens weren't fixed.
- 1577 **Brahe** used parallax to prove comets are distant entities beyond the stars.
- 1584 **Giordano Bruno**: Universe has no center or circumference, our solar system is insignificant in the universe.
- 1608 **Simon Stevin**: The Moon causes the ocean's tides. [The Sun is .44 as strong as Moon in causing tides.]
- 1609 **Johannes Kepler** *Astronomia Nova*: Planets orbit the Sun in ellipses. Planets speed up closer to the Sun.
- 1610 **Galileo's** *Sidereus Nuncius* described spots on the Sun, craters on the moon. His telescope saw four moons orbit Jupiter and said that Venus orbits the Sun. He supported heliocentrism.
- Simon Marius** (1573-1624), German, rediscovered **Al-Sufi's** 964 fuzzy cloud in *Andromeda* constellation.
- 1619 **Kepler**: *Harmonices Mundi*. His third law of planetary motion: The square of a planet's period around the Sun is proportional to the cube of its mean distance from the Sun. Formula valid for any planet's orbit.
- 1632 **Galileo's** *Dialogue on the Two Great World Systems, Ptolemaic & Copernican*, a defense of heliocentrism.
- 1656 **Geminiano Montanari** discovered that the star Argoli is not steady in brightness, i.e., a variable star.
- 1665 **Christiaan Huygen**: Mar rotates every 27.67 hours; he saw Saturn had rings and a satellite / moon, Titan.
- Giovanni Cassini** led the Paris Observatory, determined the rotational speeds of Jupiter, Mars, & Venus.
- 1669 **Robert Hooke**: All planets have an attraction to each other, the precise attractive strength unknown.
- 1670 **Isaac Newton**: The universe is static. Gravity keeps it together. Matter overall is uniformly distributed. He said that due to centrifugal force, the Earth bulges at the Equator (true).
- 1672 **Jean Richter**: A pendulum is slower at the equator than at the poles, so Earth is not a perfect sphere but a flattened sphere. (as **Newton** had said). He also calculated Mars's orbit by triangulation.
- 1672 **Giovanni Cassini & Richter** measured the parallax of Mars, deduced the Earth-Sun distance, just 7% low.
- 1675 Britain built its Royal Observatory in Greenwich, across the Thames from London. Its *longitude* set at zero.
- 1678 **Edmund Halley** mapped 341 stars seen only from the Southern hemisphere, earned entry in *Royal Society*.
- 1684 **Newton** told **Halley** he had calculated that the planets' orbits were ellipses. **Halley** urged him to publish it.
- 1687 **Newton's** *Principia*: Gravity and 3 laws of motion explain tides, **Kepler's** laws, & everything in the universe.
- 1705 **Edmund Halley**: Comets in 1531, 1606, '82 are same comet; will return in 1758. It did, so named after him..
- 1715 **Halley** calculated the shadow path of a solar eclipse.
- 1716 **Halley**: Earth-Sun distance can be discovered by measuring the transit of Venus across the face of the Sun.
- 1729 **James Bradley** discovered the aberration of light, conclusive evidence the Earth rotated.
- 1750 **Thomas Wright** speculated that the *Milky Way* was a flattened disc of stars and some nebulae may be other groups of stars beyond the *Milky Way*.
- 1755 **Immanuel Kant** saw the Andromeda *nebula* in the *Milky Way's* constellation of Andromeda, posited that cloudy points of light in the heavens are "island universes" far beyond the *Milky Way*, our "island universe."
- 1774 **Charles Messier** found 100 cloudy points of light in the heavens, called them *nebulae* (clouds). Galaxies were not then known to exist, so he didn't realize they were galaxies beyond our *Milky Way* galaxy.
- 1781 **William Herschel** discovered Uranus, first planet found beyond Saturn, then thought to be the most distant.
- 1783 **John Michell** posited regions in space whose gravity attraction was so strong it would attract and engulf light, called them dark stars. They are invisible. Later their existence was proven; now called black holes
- 1785 **Herschel** (ref 1781), built a telescope nine times more powerful than the Astronomer Royal's. He said that our solar system (our Sun and planets) was part of a group of several million stars.

He drew a diagram of the stars he saw (now known as our *Milky Way* galaxy) in the shape a pancake.

1786 **Herschel** noted 2,500 cloudy spots that he called *nebulae* /clouds and thought they were in the *Milky Way*.
He printed a catalog including the *nebulae*.(now called galaxies). Our *Milky Way* was considered to be the whole universe until the 1920s when **Hubble** confirmed nebulae were outside and beyond the *Milky Way*.

1791 **Erasmus Darwin** described a cyclical expanding and contracting universe.

1795 **Pierre Simon Laplace** discussed classical bodies with escape velocities over the speed of light

1796 **Laplace** posited the solar system formed from a spinning nebula of gas and dust.

1799 **Laplace** calculated planets' orbits mathematically, said math, not God (as Newton said), kept planets in orbit.

1800 **Herschel** (ref. 1781, '85-86) discovered and measured energy from parts of the Sun's electromagnetic spectrum outside the portion of visible light, higher energy from red, i.e., infrared, thus spectroscopy.

1801 **Guiseppi Piazzi** saw an asteroid (rocky object smaller than a planet,) orbit Sun between Mars and Jupiter.

1802 **William Wallaston** saw dark lines in the solar spectrum.
Herschel (ref. 1781,'85-6,1800) discovered binary stars, two stars linked rotating around each other.

1805 **Herschel** catalogued 2,500 star clusters in the *Milky Way*.

1814 **Joseph von Fraunhofer** split sunlight with a prism (like **Newton**), saw 574 gaps in sunlight's spectrum. He detected sodium in the Sun, crucial to later study, saw a gaseous body's spectrum is discontinuous.

1838 **Freidrich Bessel** using triangulation measured the distance to the star, 61 *Cigni*; discovered it was 10 light years away, 58.8 trillion miles, 500K times further than the Sun. (Some stars are millions of times further).
Using spectroscopy, he saw stars with same chemical makeup and temperature as our Sun.
So stars and our Sun were alike; so our Sun is a star. He detected sodium in the Sun.

1842 **Christian Doppler** said light waves' frequency goes up when approaching, down if receding.

1843 **Heinrich Schwabe**: Sunspots have regular cycles, estimated the sunspot's cycle to be a period of c.10 years
Lord **Rosse** discovered a nebula with a distinct spiral shape.

1845 **John Adams** and **Urbain Le Verrier** said that a planet must exist that caused an anomaly in Uranus's orbit.

1846 **Johann Galle** saw Neptune where **Adams** predicted. **Wm. Lassell** saw Neptune's moon Triton 17 days later.

1848 **Hippolyte Fizeau** saw a redder end of the visible light spectrum in the spectrum of stars (redshift)

1857 **James Clerk-Maxwell**: Apparent solid ring around Saturn is many tiny satellites. A solid ring would tear apart.

1859 **Gustav Kirchhoff & Robert Bunsen** inferred dark lines in the Sun's spectrum indicated different elements

1866 **James Clerk-Maxwell** showed light was a subset of the wavelike phenomenon by which charged particles interact, known as electromagnetic radiation of the electromagnetic spectrum.
Giovanni Schiaparelli: A meteor stream occurs when Earth passes through a comet's orbit that left debris

1868 **Hippolyte Fizeau** (1848) said a shift in the spectral lines of stars was due to the **Doppler** effect.

1868 **Pierre Janssen** and **Norman Lockyer** concluded that a dark line in the Sun's spectrum indicated an element then unknown on Earth, named it helium (Helios = sun), which was later found on Earth and isolated.
Wm. and Margaret Huggins used **Doppler** effect of electromagnetic waves to figure how fast stars recede.

1869 The **Hugginses** determined Sirius (brightest star in the Northern sky) was moving away from Earth at 20 mps.

1872 **Henry Draper** photographed Vega's spectrum of. Showed importance of spectrography to understand stars.

1877 **Asaph Hall** discovered moons of Mars. **Giovanni Schiaparelli** saw lines on Mars he called canals.

1905 **Einstein**: Special relativity, space and time are not separate continua. Speed of light is a universal constant.

1906 **Enjar Hertzsprung** measured brightness of stars, showed a relationship between color and size of the star.

1907 **Hertzsprung** described giant & dwarf stars; discovered a correlation between brightness and size of stars.

1908 **Henrietta Leavitt** discovered cepheids, variable brightness stars, with regular periods, from 1-100 days.

19 12 **Vesto Slipher** measured redshifts and blueshifts of stars and nebulae; said most nebulae receded.

1913 **Neils Bohr** showed details of an object's spectrum could identify the object's chemical composition.

1814 **Harlow Shapely** using cepheids derived the overall shape of our *Milky Way*. He determined that our solar system was on the outskirts of the *Milky Way*, 27,000 light years from its center, which was 100,000 light years across. **Hubble** used the technique in 1924 to measure the distance to *Andromeda*.

1915 **Einstein's GR** showed that density (presence of stars and nebulae) warps space-time. He predicted gravitational waves that warped space-time. (They were first found in 2015.)

- 1916 **Henrietta Leavitt** confirmed that brighter cepheids, variable stars, had longer, regular, predictable periods. **Karl Schwarzschild** used **Einstein's** theory of general relativity to revive **Michell's** 1783 idea of black holes.
- 1917 **Heber Curtis** saw certain nebulae were 10 million times fainter than others in the sky, speculated they were island universes, later known as galaxies.
- Vesto Slipher** (1912) saw nebulae that appeared redder than stars thought to be in our Milky Way Galaxy.
- Willem de Sitter: Einstein's** unadjusted equations, properly solved, implied the universe is expanding.
- 1919 **Arthur Eddington** showed that light was attracted more by gravity as **Einstein** said, not **Newton**.
- 1920 **Heber Curtis** posited that *nebulae* were distinct separate groups of stars apart from the *Milky Way* which he called *island universes*. He defended this against **Harlow Shapely** in a great debate in Washington D C
- 1919 **Max Wolf** (1863-1932) German, showed the true shape of the *Milky Way*. Used camera to see asteroids.
- 1920 **Alexander Friedmann**, Russian, The universe may be expanding, based on **Einstein's** field equations. Most astronomers and **Einstein** then thought the universe, then thought to be the Milky Way, was static.
- 1923 **Edwin Hubble** calculated that the *Andromeda* nebula is an "island universe" (as **Kant** had posited) but 200,000 light years across and 2 million light years beyond the Milky Way. *Andromeda* was the first galaxy proven beyond the Milky Way and the farthest galaxy visible to the naked eye. He and **Milton Humason** soon discovered 46 more galaxies. They later found 800 more galaxies. Now billions are postulated.
- 1924 **Hubble** used **Shapley's** 1914 technique using cepheids to measure the distance to the *Andromeda* galaxy. **Eddington** discovered that the luminosity of a star is roughly related to its mass. (1912, '14-5, 19, '26, '30-1, '33)
- 1925 **Cecilia Payne** said the Sun is over 90% hydrogen. Senior astronomer, **Henry Russell**, said Don't publish it.
- 1926 **Hubble** classified galaxies as spiral, elliptical, lenticular, and irregular. This classification is still used.
- 1927 **J.B.S. Haldane**, The universe is not only queerer than we suppose but queerer than we can suppose.
- 1928 **Jan Oort** calculated the center of the *Milky Way*. In 1928 he confirmed that the *Milky Way* rotates.
- Georges Lemaitre**: The universe began with an explosion from a single point, a singularity, called it the *Dynamic Evolving Model* of the universe, governed by **Einstein** field equations. It became the *Big Bang*.
- Howard Robertson** said **Slipher's** redshift measurements combined with brightness measurements of the same galaxies indicated a redshift-distance relation. The further away, the redder, i.e., the faster it receded..
- Hubble's Law**: Galaxies receding speed is proportional to distance from Earth; So the universe is expanding.
- 1930 **Eddington** (1919) also showed that the universe was expanding. **Seth Nicholson** measured the surface temperature of Mars. **Clyde Tombaugh** discovered Pluto, .02 (1 / 50) the mass of Earth.
- Karl Jansky** detected radio waves coming from space matter. This was ignored for decades.
- 1928 **Jan Oort**: said that the density of matter near the Sun is 2X more than visible planets would explain. This was evidence of dark matter. Said the *Milky Way* had a mass 100 billion times that of our Sun. (More 1961)
- 1933 **Fritz Zwicky** saw the gravitational effect of 8 galaxies in the Coma cluster of galaxies was 400 times what their calculated mass indicated. He inferred that there was non-visible matter with a gravity attraction keeping the cluster from flying apart. He called it dark matter. He published in an obscure journal. not noticed til 1978.
- Wilhelm Walter Baade** and **Zwicky** proposed that supernova could produce cosmic rays and neutron stars.
- 1937 **Grote Reber** constructed the first radio telescope.
- 1939 **Hans Bethe**: In the Sun, hydrogen atoms fuse into helium, releasing photons/sunlight (see 1939 in the text)
- 1948 **Thomas Gold**, **Hermann Bondi**, and **Fred Hoyle** posited a *Steady State* model of the universe.
- George Gamow** and **Ralph Alpher**: Hydrogen and helium are 99.99% of the universe. This was evidence for the *Big Bang* model. They also predicted the existence of cosmic microwave background radiation (CMB).
- 1950 **Fred Hoyle**: (*Steady State* Model) called the *Dynamic Evolving* model (1927) the *Big Bang*, the name stuck.
- 1952 **Walter Baade**: Distances to galaxies are twice as large as thought, so doubled the known size of the universe
- 1953 The *Big Bang* model of the universe could explain the origin of helium. *Steady State* model didn't.
- 1960 **Robert Leighton** discovered solar 5 minute oscillations by observing the **Doppler** shifts of solar dark lines.
- 1961 **Oort** (1933) discovered comets come from an area 9T miles from the Sun, now called the **Oort Cloud**.

- 1961 The *Big Bang* model posited young galaxies could only exist in a young universe.
Robert Dicke: Carbon based life can only arise when gravity is small, as that's when burning stars exist (first iteration of the weak anthropic principle, see 1973).
- 1963 **Maartin Schmidt** was the first to recognize a quasar, measured spectra of quasars, very distant galaxies.
- 1965 **Arno Penzias** and **Robert Wilson** (Bell Labs) discovered radio waves coming from the Sun and from all over the universe. They were thus considered a remnant of the *Big Bang*, This was the birth of radio astronomy which can detect stars beyond the vision of telescopes. Radio astronomy indicated that younger galaxies appeared mostly in the far reaches of space.
- 1966 **James Peebles** showed that the *Big Bang* model predicts correct abundance of helium, *Steady State* didn't.
Stephen Hawking and **George Ellis** showed that any plausible general relativistic cosmology is singular.
- 1967 **Robert Wagoner, William Flower, and Fred Hoyle** showed that the *Big Bang Model* predicted the correct abundances of deuterium and lithium.
- 1967 A *Gamma-ray burst* detected: Brightest electromagnetic event known to occur. Billions of light years away, Clusters of galaxies were discovered organized into giant bubbles measuring c.300M light years across
- 1967 **Jocelyn Bell & Antony Hewish** found a pulsar, new type of star, very distant, extremely dense & spinning.
- 1968 **Carl Sagan:** The universe has 100 trillion trillion stars. (100,000,000,000,000,000)
- 1972 **Stephen Hawking** proved that the event horizon of a black hole could not decrease.
Charles Bolton showed firm evidence of black holes.
James Bardeen, Brandon Carter, and Hawking proposed four laws of black hole mechanics.
Jacob Beckenstein suggested that black holes have an entropy proportional to their surface area.
- 1973 **Jeremiah Ostriker** and **James Peebles** discovered that the amount of visible matter in the discs of typical spiral galaxies is not enough to keep the disks from flying apart by centrifugal force or drastically changing shape. So they posited some dark matter with gravitational pull in such galaxies to keep the discs together.
Edward Tryon: The universe may be a large scale quantum mechanical vacuum, positive mass-energy balanced by negative gravitational potential energy.
Bruce Balick and **Robert Brown** discovered a super massive black hole near the center of the Milky Way.
- 1974 **Hawking** applied quantum field theory to black holes and showed black holes will radiate particles with a black body spectrum which can cause black body evaporation.
- 1978 **Zwicky** (1933) vindicated when **Vera Rubin** found 60 galaxies rotating faster than their presumed mass could explain. So, *something* with a gravitational effect existed to keep them from flying apart, dark matter.
- 1980 **Alan Guth & Alexei Starobinsky** separately said the *Big Bang* may solve the horizon and flatness problems.
- 1981 **Robert Kirschner, August Oemler, Paul Schlechter, and Stephen Schectman** saw evidence of a huge void around 100 million light years across in the galaxy Boote.
- 1981 **Viachestav Mukhanov:** Quantum fluctuations could lead to large structures (stars) in an expanding universe.
- 1982 Several cosmological researchers independently said the universe is mostly dark matter.
- 1980s **Stephen Hawking** and others: A Wave function inferred a 95% probability that the universe was uncaused.
Clusters of galaxies were discovered organized into giant bubbles measuring c.300M light years across.
- 1987 **David Burstein** said a large group of galaxies 200M light years from the Milky Way are moving together.
- 1990 Orbiting space telescope **Hubble** launched; found most galaxies have a super-massive black hole at their center.
The Cosmic Background Explorer satellite proved that CMB was blackbody, not starlight, falsifying QSSC.
- 1991 **Hubble** telescope, in low Earth orbit, found pancake shaped objects in a distant cloud of dust and gas.
It was the first notice of proto-planetary disks- the birthplace of stars and planets.
- 1992 Minute variations found in cosmic microwave background radiation (CMB) showed that there were areas in the universe where gravity could allow matter to coalesce and stars and galaxies to form. **Hawking** called it such discovery the discovery of the century, if not of all time. First exoplanets were found, orbiting a pulsar.

- The orbiting telescope **Hubble** found evidence of dark matter in galaxies too small to bend light rays.
- 1993 The orbiting telescope **Hubble** found galaxies in mid-collision, with spectacular streams of stars, gas, dust.
- 1995 A planet was detected that orbited a star outside the *Milky Way*. Soon more such planets were discovered.
- 1998 Certain galaxies were found by **Adam Reiss** to accelerate apart faster than their known / visible mass would permit. Some kind of non-visible energy appeared to cause it. It was named Dark Energy.
- Astrophysicists: "Empty" space contains 10-29 grams (.02-.06 pounds) of invisible matter per cubic centimeter. The *Andromeda* galaxy was estimated to have 1 trillion stars, twice the *Milky Way* galaxy.
- 1999 The Lunar Prospector intentionally crashed into Moon in attempt to identify water. None was found.
- 2003-4 The **Hubble** Space Telescope made repeated images of a region of the sky that, combined together, make up the **Hubble** Ultra-Deep Field, the deepest picture of the universe ever made.
- 2005 **Mike Brown** et al discovered a large body in the outer Solar System. It was temporarily named as UB313. Initially it appeared larger than Pluto, and was called the tenth planet.
- 2006 The International Astronomical Union adopted a new class of objects, dwarf planets. Pluto was so defined.
- 2008 The first Earth-impacting meteoroid was spotted and tracked prior to impact (named the TC.3)..
- 2010 **Hawking** and **Leonard Mlodinow**: "M-theory indicated spontaneous creation caused the universe. "Spontaneous creation is how there is something rather than nothing, how the universe exists, how we exist.
- 2012 **Lawrence Krauss**: A quantum fluctuation created the universe.
- Suvi Gezari et al** published an image of a massive black hole engulfing a red giant. The Large Hadron Collider probably discovered the **Higgs** Boson. NASA found millions more black holes. The Very Large Telescope (visible light and infrared telescopes) in Chile detected 12 large starless galaxies (called "dark" galaxies. Dark matter can't be seen, but collisions of dark matter particles produce electrons (and very rarely) positrons. The International Space Station spectrometer in 2 years detected 400,000 positrons, an amount consistent with models of dark matter particle collisions.
- 2013 **Louis Irwin**: The **Kepler** telescope spacecraft (designed to find exoplanets) found that .1% of the *Milky Way's* c.100 billion planets may be habitable. The Dragonfly Observatory (ten 16 inch telescopes, 10X more powerful than one very large lense telescope) found 50 dwarf galaxies near the *Milky Way*, each with dark matter. Each has 100 times more dark matter than visible matter.
- 2014 *The Standard Model of Cosmology* was published, see at 2014 in the main text.
- 2014 Rosetta spacecraft orbited a comet after a 10 year flight. After 17 months orbiting, it will put a lander down. Liquid water was detected 20 miles under Saturn's ice surface. Over 1800 exoplanets have been discovered. A black hole 12B times bigger than the Sun was detected in a distant quasar, 2X bigger than any other known.
- 2015 NASA said the *Milky Way* may have c.1 B Earth-like planets. **Kepler** telescope identified 4661 such exoplanets, including one orbiting the star Kepler 452 (that could contain water) that was 1.6 times Earth's size
- 2015 Gravitational waves from 1.3B light years ago were detected. NASA confirmed that there is water on Mars.
- 2016 Caltech scientists predict a 9th planet in our solar system, 10X bigger than Earth & 10-20X further away than Pluto
- NASA and the European Space Agency said the universe is expanding 5-9% faster than previously known.
- 2017 Astronomers learned that two stars collided 130 million years ago emitting a gravitational wave.
- 2018 **Pieter van Dokkum** and team reported in *Nature* a small galaxy 60 million light years away with no dark matter. He used a dragonfly observatory. (Ref. 2013-this timeline)
- As of 2022, NASA had identified over 5,000 exoplanets.
- 2024 Scientists found a black hole 17 billion times larger than our Sun that eats the equivalent of one sun per day. Astronomers also confirmed a massive black hole, *Sagittarius-A*, in the center of our *Milky Way* galaxy

Aphorisms, Heuristics, Popular Knowledge, Shorthand Thinking

To err is human. . . No pain, no gain. . . Knowledge is power. . . hypocrisy is the tribute vice pays to virtue. .
You get what you pay for. . . An apple a day. . . They're all alike. . . Think outside the box. . . Life is short. . .
Keep it simple. . . A stitch in time. . . When the going gets tough. . . You are what you eat. . . Every cloud
has a silver lining. . . You learn something every day. . . Sticks and stones. . . Don't sweat the small stuff
. . . Be prepared. . . Think big...Enjoy yourself. . . Make love, not war. . . It's always darkest before the dawn. . .
. . . Just say no. . . Words are cheap. . . You reap what you sow. . . A rising tide. . . A family that prays together.
. . . Trust but verify. . . Do unto others. . . Don't believe everything you read. . . Early to bed. . . Follow your
dream. . . She asked for it. . . Money talks. . . Life is a test. . . Love of money is the root of all evil. . .
You can't teach an old dog . . . When in Rome. . . If you don't like the heat. . . Don't bite off more than
you can chew. . . A squeaky wheel. . . If it ain't broke. . . Look before you leap. . . An ounce of prevention. .
. . . Be nice to people on your way up. . . Practice makes perfect. . . Chance favors the prepared mind. .
Blessed are. . . Don't put off until tomorrow. . . God helps those. . . A penny saved. . . He that lies
with dogs. . . Be slow in choosing a friend. . . Well done is better than well said. . . Don't tell; show. . .
Little strokes fell great oaks. . . No good knife was made of bad steel. . . Be good to your body. . .
Virtue is its own reward. . . Bad things come in threes. . . Actions speak louder than words. . . All's fair
. . . Any port in a storm. . . That's the way the cookie crumbles. . . Beauty is only skin deep. . .
There's many a slip. . . The bigger they are. . . Don't burn your bridges. . . It's only money. . . people
who live in glass houses. . . In the country of the blind. . . Love thy neighbor. . . We have met the
enemy. . . You can fool some of the people. . . He who hesitates. . . Where there's a will. . . Make hay. . .
Better safe. . . Practice what. . . Honesty is. . . Don't count your chickens. . . A chain is only as strong. . .
The grass is always greener. . . Birds of a feather. . . A picture is worth. . . The early bird. . .
Rome wasn't built. . . Strike while the iron. . . Better late. . . Keep your friends close. . . Two wrongs. . .
Easy come. . . Don't bite the hand. . . All work and no play. . . Where's the beef?. . . He that pays the
piper. . . Time is money. . . Pride goeth. . . To everything there is. . . Seeing is believing. . . Keep
conscience clear, then never fear. . . Don't judge a book by. . . Virtue is its. . . You can lead a horse
to water. . . "Necessity knows no law" When someone says, "It's *not* the money", it's the money. . .
Never let a crisis go to waste . . . A chain is only as strong . . . Hay in the barn is money in the bank. . .
Where there's smoke . . . A rising tide lifts all boats . . . Actions speak louder than words.
All for one and one . . . Don't fire until you see the whites of their eyes. . . Give him an inch
He who fights and runs away, . . . Laugh and he world laughs with you; weep
You can kill a man but you can't kill an idea. . . You can take the boy out of the country, but . . .
You made your bed, now lie in it All hat, no cattle Money talks .Aphorisms are a dime a dozen.

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Logical Fallacies, Faulty Reasoning

The advance of knowledge depends on clear reasoning. See www.laetusinpraesens.org/links/webcrit.php.

Arguments consist of premises and conclusions. A *formal* fallacy is an argument with a premise and conclusion that doesn't hold up. An *informal* fallacy is an error in the form, content, or context of the argument. Statements using logical fallacies impede clear thinking (see pp.396-400) and are probably but not necessarily, false. Some logical fallacies:

Name of Fallacy	Description / Example. Many fallacies are <i>non-sequiturs</i> ; conclusion doesn't follow premise.
Begging the question	Assuming the matter to be proved. When the conclusion is explicit or implicit in the premise.
<i>Ad Hominem</i>	Attack the speaker, not his ideas. A speaker's history & beliefs are probative, but not conclusive.
<i>Ad Hominem Tu Quoque</i>	You did it too, so it's OK. Focusing on the accuser.
Guilt by association	All his friends are Commies / fags, etc., so he's a Commie / fag, etc. (like <i>Ad hominem</i>)
Appeal to faith	It's in the <i>Bible</i> / <i>Qur'an</i> / <i>Vedas</i> / <i>Analects</i> , so it's true. (Appeal to Divine Authority)
Appeal to prejudice	Those immigrants are taking American jobs. Immigrants usually do work Americans disdain.
Appeal to popular belief	a/k/a Truth by Majority Opinion, a/k/a Band Wagon. "Everybody believes it, so it's right"
Appeal to tradition	It's always been done this way. So this is the right way to do it. (like Appeal to Authority)
Appeal to emotion	See all the handsome happy people drinking Bud Light (Bud plus water). (Bandwagon)
Appeal to patriotism	Stand up for America, Vote for the man who loves his country, a real American.
Appeal to fear	You'll burn in Hell if you don't: 1. Believe-in-God. 2. do-such-and-such. 3. Go to church.
Appeal to flattery	You are such an astute investor I know you'll see the value in Schlock Inc. securities.
Appeal to motive	You're just saying that because you love / hate me, or. . . Because you're a man / woman.
Appeal to probability	Soccer fans are thugs. So if we have a soccer team here, thugs will ruin the town.
Appeal to prejudice	"Only fags wear garters." In politics, "He's one of us.."
Appeal to ridicule	"Hey, Macaca, Welcome to America." (This wisecrack caused Senator Allen to lose re-election)
Appeal to vanity,	Buy this suit, you'll look sharp. Real men chew tobacco. This Vette hits 60 in 4 seconds
Appeal to novelty	It's new, so it's good. That's an old argument, it's outdated. So, forget it. (<i>Non-sequitur</i>)
Equivocation	Sugar Co. ad: <i>Sugar</i> is essential for health! But it's glucose sugar, not table sugar.
Hidden agenda	Billionaire says, "Senator X is anti-business." His hidden agenda? "X wants to raise my taxes."
Dueness fallacy	Red hit 6 times; so black is due. Hot streak fallacy: Red hit 6 times. I'm sticking with a winner
False dilemma,	Limiting possible answers to two alternatives excluding reasonable/correct alternatives.
Hasty generalization	His hands are sweaty, don't trust him. (<i>Non-sequitur</i>)
Transferred expertise	When an expert in one field is considered expert in another field. (<i>Non-sequitur</i>)
Racial /sexism fallacy	It's a woman / guy / black / gay thing; you wouldn't understand. (<i>Non-sequitur</i>)
Naturalist fallacy	If it's natural, it's healthy / good. (<i>Non-sequitur</i>)
Half truth, to palter	True statement that misleads as it omits necessary facts. Yiddish proverb, A half truth is a whole lie.
Genetic fallacy	A statement is true or false depending on who said it. That's what Jesus / Hitler said.
Straw-man fallacy	Claiming X said/did something foolish that X didn't actually say/do, to easily discredit X.
True Scot fallacy.	Scot: No Scot would do such a thing. Cop: But it was a Scot. Scot: No true Scot would do it.
Circular reasoning	God exists as the <i>Bible</i> says so. "All scripture is given by inspiration of God." 2 <i>Timothy</i> 3:16.
The Stolen Concept	All property is theft. The concept theft assumes while it denies the validity of concept property.
Anthropomorphism	Attributing human characteristics or motives to something impersonal, irrational or an animal
Middle ground fallacy	Joe says dogs cause warts. Bob says no. So maybe some dogs cause warts.
Misleading vividness	The plane crash yesterday killed 250 people. So, I'll drive.
Faulty implied premise	Your premise is faulty, so your conclusion is wrong. Probably, but not necessarily.
Biased / small sample	Quoting only old people on the benefits of the Social Security system.
Fallacy of the consequent	Women / slaves / serfs are inferior as they let men control them.
<i>Post hoc ergo propter hoc</i>	X happened before Y, so X caused Y. Maybe, even probably, but not necessarily.
Quoting out of context	Movie reviewer, "Not one of his best films." Ad in paper, "One of his best films."
Argument from inference	You haven't proved <i>UFOs/God doesn't</i> exist. So they/He must exist. (<i>Non-sequitur</i>)
Argument from ignorance	No one knows what caused X; so it must have been done by God. (<i>Non-sequitur</i>)
Appeal to consequences	If you don't believe in God, where do you go when you die?" (also a false implied premise)
Confusing cause and effect	X and Y happened at the same time, so Y caused X. Maybe, but not necessarily.
Category error, apples & oranges	Comparing matters that are in different categories, and judged by different criteria.
Red herring, a fallacy of relevance	Asserting an irrelevant fact to divert interest from the relevant subject.
<i>Non-sequitur</i> / It does not follow	She's blond, so she's dumb. Conclusion doesn't logically result from premise.
Confirmation bias / Selective perception	Using only favorable evidence to support a pre-determined idea.
Slippery slope/camel's nose under the tent	Let one of those people in the neighborhood, they'll take over.
False equivalence/Both-sidesism (journalists's cop-out)	Quoting both "sides" without analysis, inferring equal validity.

Index and Glossary

Words on pages 1-395 are indexed to the year (left margin), *not* to the page they're on.

Words in other pages are indexed to the page they appear on. Name prefixes like "de, da, du, al, van, von," mean *of* or *from* or *may* denote nobility of some rank, inherited or awarded. They are mostly ignored in the alphabetization in this Index, as is the custom in Europe where most are (not the US). This Index may use the name that the person is best known by. Like Galileo Galilei and Napoleon Bonaparte are best known as Galileo and Napoleon. Some words are not indexed as they appear so often that where they are found is not useful.

A

- Abdullah Yusuf Ali: translator of the *Qur'an*, 644
- Abdul Mecid: Turkish sultan, reformer, *Tanzimat*, 1839
- Abdullah, Naeem: *Islam, A Favor to Humanity* 2009.
- "The world today is fast becoming one.
- Humanity is one. God is one and mankind are all part of one human family. All religions are connected, and they all lead to faith in the one God, no matter what name we give him, He is but one God."
- Abelard, Peter: *Sic et Non*, monk, teacher of, lover of, husband of, Heloise. c.1000, 1076, 1121-2, 1140, 1225, 1331, 1687, p. 416-the *Index*,
- Abraham: nominal founder of Judaism, c2000 BC, 1360 BC, AD 622, 644
- Abrahamic God: The Christian, Jewish, and Muslim Gods, as all trace their origin to Abraham.
- Absolute time and space: Newton's concept of force in Newtonian mechanics needs a reference point to measure the velocity of a body and its rate of change relative to such point. Newton thus postulated an absolute space and absolute time with respect to which the forces and movements in nature should be measured. Absolute time flows uniformly on without regard to anything external. 1609-Kepler, 1687-Newton, 1886, 1915
- Absolute zero: The lowest theoretical temperature. where all molecular activity ceases. In 1665, Boyle speculated such existed. In 1848, William Thomson calculated it at minus 273.16 Celsius.
- Temperatures starting at absolute zero are named Kelvin with the same value as Celsius / Centigrade. (Thomson was made lord Kelvin in 1892). 1661, 1702, 1802, '46, '48, '50, 1906
- Abu Bakr: first successor to and last father-in-law of Mohammed, 624, 630
- Abu Said Sinjari: suggested heliocentrism c.1031
- Abul Fazi: historian, *The Book of Akbar*, 1589
- Academy of the Mysteries of Nature*: della Porta, Giambattista, first scientific society. 1560
- Acceleration: *rate* of increase of increase of velocity, 1020, 1605, '87, 1907, '15, '98
- Achilles: hero of *the Iliad*, fought King Agamemnon, Ninth century BC
- acid: chemical substance that when dissolved in water produces hydrogen ions, which may be replaced by metals to form salts.
- "Act of God:" phrase used in religious texts as early as the 13th century, referring to acts that God caused, such as floods or the plague. .
- Act of Toleration*: England, 1689, granted certain rights to non-Anglicans, but not to Catholics or non-Trinitarians (i.e., non-believers in the Trinity), atheists, or Dissenters. 1689
- Acton, Lord / John Edward E Dahlberg: Catholic, fought the concept of papal infallibility: "Power tends to corrupt. Absolute power corrupts absolutely." "The bonds of class are greater than those of nationality." 1862, '70, '80 '87, 1963,
- Acute angle: under 90 degrees. Obtuse angle, over 90
- Ad abolendam*: Pope Lucius's *Bull* authorizing bishops' inquisitions to fight heresies. 1184
- Ad exstirpada*: Pope Innocent 4's *Bull* authorizing torture of *possible* heretics. 1252
- Adams, Abigail: wife of John Adams, asked John "to remember the ladies." He didn't. Said, No man ever prospered. . . without the consent and cooperation of his wife. 1776
- Adams, John: third president, 1809, revolutionary, believed fervently in property rights, "The science of government is my duty to study, more than all other sciences; the arts of legislation and administration negotiation ought to take the place of, indeed exclude in a manner, all other arts. 1624-deist, 1739-Hume, 1776-Age of Paine-Abigail, 1779-property, 1785- Muslims, 1789-deist
- Adams, Sam: American revolutionary, 1773, '89
- Addison, John (1672-1719): essayist, poet, p. 416
- Adelard of Bath: scholar who went to Toledo. 1085
- Adonis: Syrian resurrected god, 2400 BC, 300 BC
- Advancement of Learning*: Francis Bacon. 1605
- Aeneas, hero of Virgil's *Aeneid*. c25 BC
- Aeneas, Sylvius: Pope Pius 2, 1430
- Aeschylus: Greek, invented drama by adding a player to ceremony worshiping the god of wine, *The Persians*, 472 BC, was the first historical play, about the Greeks beating the Persians. c500 BC
- Aesop: Greek, "Any excuse will serve a tyrant."
- Aesthetics: deals with the nature of art, beauty, and other sensual experiences. 425 BC, 1273
- Aeterni Patris*: Pope Leo 13, 1885
- Afterlife: an existence after one dies. The major

religions use the concept of an afterlife to control their members. Christians go to a Heaven or a Hell based their fealty to Christian dogmas.

Hindus and Buddhists are reincarnated to a better or worse new life depending on their obedience to the rules of their philosophies. 370,000 BC, 35,000 BC, 7599-5600 BC, 5000 BC, 3200 BC, 2700 BC, 2400 BC, 1775 BC, 1400 BC, 600 BC, 350 BC, 168 BC, 150 BC, 58 BC, c.AD 49-c.60, AD 70-90, AD 96, AD c.90, 1308-20, 1638, 1770, 2010, pp. 405, 416.

Al Afghani Sayyid Jamal al-din: Muslim reformer, *Refutation of the Materialists* 1859, '82, '86

Against Method: Paul Feyerabend, 1975

Agamas, Jain: astronomer. Universe is uncreated, it has existed from eternity. p. 436

Agamemnon: King, in *The Iliad*, ninth century BC, "Fear is stronger than arms."

Age of Pericles, The: 431-404 BC.

Age of Reason, The, and *The Age of Reason, Part 2*: Thomas Paine's attacks on religion, 1793, '95

Age of the Holy Spirit, The: Joacim of Fiore. 1200

Agnosticism: Any view that knowledge in a given field can't be known, coined by Thomas Huxley in 1860, re existence of God.

399 BC-Socrates, 1751-Hume, 1869-Huxley, 1871, 1873-Leslie Stephen, 1893, 1912-Russell, 1925-Clarence Darrow.

Agrarian Justice: Thomas Paine. 1779, 1797

Ahab, Israelite king: 900 Ahura-Mazda, god. c600 BC

Aikenhead, Thomas: Scot, student, criticized Jesus, so Presbyterians killed him. 1696

Airplane: heavier than air flying aircraft. Wright Brothers, 1903

Aisha: Mohammed's last wife. 624

Akbar, Book of, Abul Fazi, Sufism. 1589

Alain: pen name of Émile-Auguste Chartier, influential French philosopher, "Nothing is more dangerous than an idea when it is the only one we have." 1938

Alaric: Visigoth, sacked Rome, bought off. 410

Alberti, Leon: perspective in art. 1430

Albertus Magnus: great 13th century philosopher, taught Aquinas. 1200, '17, c'69, 1331, 1687

Alcmaeon: Pythagorean pathologist. c.480 BC

Alcock, John, and Arthur Brown, Brits, first to fly the Atlantic nonstop. 8 years before Lindbergh. 1919

d'Alembert Baptiste le Rond: co-founded the *Encyclopedie*, a philosophe. 1751

Alexander 3: pope, corrupt. 1158

Alexander 4: pope, 1200

Alexander 6: pope, Rodrigo Borgia, corrupt and gave church lands to his children, 1493-4, 1500, '36,

Alexander 7: pope, 1657

Alexander the Great: Macedonian, tutored by Aristotle, conquered the three largest Western civilizations. 335-4 BC, 300 BC

Alexandria: Western intellectual capital after Athens, 330 BC, AD 150, 400, 415, 549, 642, 1440

Alexandria Library: 330 BC, 270 BC, 140 BC

Alexis: son of and killed by, Peter the Great. 1703

Alfonso: king of Naples, saved Lorenzo Valla, 1440

Algebra / al-Jabr: branch of mathematics whose principal concern is the study of formal systems, such as groups and fields which generalize various aspects of ordinary arithmetic. 825, 850, 1085, 1202, 1430, 1637, '83, 1796, 1912, '25

Alger, Horatio: wrote uplifting books for boys. 1867

Algorithm: any particular procedure to solve a certain type of problem.

Ali Qushji: presented empirical evidence that the Earth rotates, 1450, p. 433

Allegory of the Cave: Plato. 387 BC

Allegory: description of a subject under the guise of a description of another subject, like Orwell's *Animal Farm* (1945) depicted Soviet society. All animals are equal but some animals are more equal than others.

Allen, Joel: Within a species, in colder climes, with smaller appendages are better fitted to survive reproduce. 1877

Allotrope: an element with more than one natural form like carbon (charcoal or a diamond.)

Alloy: a substance formed by the combination of two or more elements, at least one of which is a metal. 1100, 1450, 1780

Alpha particle: a helium nucleus, radiation is alpha, beta, gamma, or other particles, 1919

Alphabet: type of writing words where individual letters represent simple sounds, 3000 BC, 900 BC, 620 BC, 449 BC, 1300, 1703

Alpher, Ralph, with George Gamow: wrote *The Origin of Chemical Elements* 1948, supported the *Big Bang* model of the universe over the *Steady State* model. 1948, '64

Alternating current: used in most houses where the current reverses direction 60 times per second.

Althusius, Johannes: monarchomach (people rule) concept of the nation-state. 1609

Ambrose: layman named bishop of Milan. "How far, O rich, do you extend your senseless avarice?" A wise man is always free. . . One who acts with wisdom has no fear." AD 374, 392, 410, 414, 1751

Amenhotep 4: pharaoh, said there's only one god, Aton, the Sun god, the first monotheistic religion. At his death, the polytheistic priests of Ammon Ra discarded Aton. c.1370 BC

An American Crisis: Thomas Paine, Dec. 1776

America First:: phrase used by Woodrow Wilson in 1916 to remind voters that he did have the US join WW1, then the motto of the Ku Klux Klan.. In the US, It was on the masthead of William Randolph Hearst newspapers. It was the name of the pro-fascist anti-Semitic *America First Committee*, organized in 1940 to help Hitler by keeping the US from aiding the countries Hitler overran. It has been used by Republican politicians Warren Harding, Pat Buchanan, and Donald Trump.

American Revolution: led by propertied men of the *Enlightenment*. 1775-'81

Ammianus Marcellinus: Roman, ridiculed the bishops in Rome for their vanities. AD 385

Amontons, Guillaume: first known to say that a higher temperature caused air to expand. 1666, 1699, 1701, '87, 1802, '08

Ampere, Andre: electrodynamics, a magnetic field is proportional to its electric current. pp. 425-6

Ampere, amp: unit of electric current where one unit of of an electric charge analogous to the unit *cubic meters per second* that we use for the *flow* of liquids flowing down a river. One unit of *charge* is the coulomb, named after Charles Coulomb. One definition is the amount of electric charge that flows past a given point in a wire in one second if the current is one amp.

Amundsen, Roald, arctic explorer, 1926,

Amygdalae: a region deep in the brain in complex vertebrates, including humans, that have a primary role in processing of memory, decision-making, and emotional reactions.

Anabaptists: Christian sect persecuted by popes and Protestants. 1517, '24, p. 377

Anacletus 2 / Petrus Leonas: pope. 1139

Analects: Confucius's writings. 300 BC, 530 BC

Analogy: use of a simple well known concept to explain a more complex concept. Some analogies are similes and some are metaphors. A simile compares two things using the words "as" or "like." They're alike as peas in a pod. Metaphors compare two unlike things that have something in common. Example: "He's a diamond in the rough." Shakespeare used analogies extensively. It's a useful literary device when used properly, that is, when subjects are similar. 1724-Leibniz, 1776, '79, 1973, 2013

Analytic geometry: idea that graphs and equations are two ways to depict the same concept. 1637

Analytic philosophy. The philosophical approach that emphasizes logic, attention to language, and simplicity of argument

Anarchism: political doctrine. No government is best as a government is Man's enemy, 1845, '81-Bakunin, 1911, '24

Anatomy: science of the structure of animals and humans, 335 BC-Aristotle, 644-study banned by Mohammed, 1486, 1543, '55, 1603, '61, 1770s, 1900

Anaxagoras: Greek philosopher, posited a design argument, and said mind is separate from matter. 450 BC, 1273-Aquinas, 1637

Anaximander: posited a concept of evolution, and advocated the principle of sufficient reason. 620 BC, 590 BC, 504 BC, 450 BC, 1859

Anaximenes: Greek, Rainbows occur naturally, 620 BC, 540 BC

Andromeda Galaxy closest galaxy to the *Milky Way*, It is approaching the *Milky Way*. 964, 1912, '24, '68, '70s, 2004.

Anglican / Episcopalian: Christian sect which evolved from the Rome based Christian Church in England after Henry 8 died. 1547, '79, '92, 1609, '11, '20, '43, '49-50, 61-2, '64, '86-7, '89, 1701, '04, '10, '49, '54, '58, '98, 1810, '26, '29, '32, '53, '60, '65, '72, '75, , '79, 1600, '11, '50, '61, '85, '87-Newton, '89, 1701, '04, '54, '58, '98, 1921, '66, '97, pp. 407, '19-21, 43

Animism: in philosophy, the view that apparently inanimate objects like mountains or streams are in fact animated and activated by souls or spirits.

Anscombe, Elizabeth: eminent philosopher who, *inter alia*, discredited C S Lewis. 1948, '81, '85

Anselm, Saint: *Ontological Argument*, the *idea* of a perfect God proves God exists, 1076, 1122, 1273, 1644, '70, 1781, 1819, pp. 406, 408, 416

Anthony, Susan B: American suffragist, 1875

Anthropic Principle: *False but popular theory* that The universe was made for man, 1961, '73, pp. 408, 435

Anthropology: the study of Man, especially his behavior in particular cultures and societies, 1651-Hobbes, 1858-Virchow, 1887-Boas

Anthropogenic: theory that God was devised by Man.

Anthropomorphism: the interpretation of God in the likeness of man. tendency to impute human characteristics to animals. 540 BC, p.403

Anti-matter: concept that each sub-atomic particle has a corresponding anti-particle. If they meet, they destroy each other, leaving pure energy. Paul Dirac. 1927

Anti-Semitism / anti-Judaism: View that Jews are inferior. Martin Luther hated Jews. Hitler falsely blamed Jews for Germany's ills. Ezra Pound: The worst mistake I ever made was that stupid suburban prejudice of Anti-Semitism. 1212, 1543, 1817, '23, '47-Zola, '82, 1927, '33-Hitler

Antiochus 4: ruled Syria, persecuted Jews. c.168 BC

Anthony, Mark: Roman senator, last consort of Cleopatra, conspired to kill Julius Caesar 43 BC

Apatheism: the belief that questions of God's existence are of little importance.

Aphrodite: Greek goddess of love, beauty. 750 BC

Aphorism: pithy, catchy statements persons use as a substitute for thinking. Many examples, p.443

Apocalypticism: Christian and Muslim beliefs in the imminent destruction of the world and the foundation of new world order. (*Daniel 12* and *The Book of Revelation St. John the Divine*.) Frances Flannery said it “has been responsible for more genocide and killing in than any other cause.” Apocalyptic beliefs are important in current Radical Islamic thinking.

Apollo: Greek god of healing. 750 BC,

Apollonius: mathematician in Alexandria, 300 BC

Apologetics: arguments for a belief, 1988

Apostle: “One who is sent out” AD 30, AD 60, AD 70, AD 150, 1376, 1440, 1517

A posteriori: knowledge derived from experience.

A priori: something known to be true or false before experience.

Aquinas, Thomas, Thomas de Aquino: most important Christian theologian. His *Summa Theologica* was the foremost exponent of natural theology, He tried to synthesize (reason) with Christian theology. Some of his beliefs are: “Woman is defective and misbegotten, for the active power in the male seed tends toward the production of a perfect likeness in the masculine sex, while the production of woman comes from a defect in the active power, or from some material indisposition, or even from some external influence, such as that from the South wind, which is moist.” “Three things are necessary for the salvation of man, to know what he ought to believe, know what he ought to desire, to be not only condemned to excommunication but even to be put to death.” 387 BC-Plato, 335 BC, 300 BC, 410, 413-4-Augustine, 1000- Scholasticism, 1059-God's power, 1076- *Ontological*, 1150-Averroes, 1200-Scholasticism, 1217-Albertus, 1269-proofs for God, 1273-*Summa Theologica*, 177-Tempier, 1290-Scotus, 1331-Ockham, 1397-humanism, 1450-Neo-Platonism, 1516-Pomponazzi, 1532-Machiavelli, 1632-Machiavelli, 1636-just war, 1632-Galileo, 1686-*Enlightenment*, 1714, 1779-Hume, 1781-Kant, 1869-Leo, '80, 1957, '91

Arabic numerals: created by Hindus, brought to Europe by Arabs, simplified math, c.499, c711, 1201, 1545

Arago, Dominique: 1821, p. 425

Aramaic: language of international trade, language of the ancient Middle East. Originated in current Syria between 1000 and 600 BC

Arbues, Pedro: Spanish Christian official, “Let the Jew be fried.” 1492

Archimedean Principle: a body weighs the same as the fluid it displaces, 220 BC, 1612

Archimedes: hydrologist at the Library of Alexandria. 300 BC, 220 BC, c.1000, c.1455, 1612

Argoli: variable star, Its brightness varies. p. 434

Arians / Arianism: early Christian sect, As Jesus once didn't exist: he's not co-equal with God; declared heretical at the *Council of Nicaea*. AD 313, AD 325, AD 410, 1738

Aristarchus: Earth orbits the Sun, 270 BC, 1514

Aristocracy: G K Chesterton: Democracy means government by the uneducated. Aristocracy means government by the badly educated. Josiah Holland: A social life that worships money and pursues social distinction as its aim is, in spirit and in fact, an aristocracy. 355 BC, 1576, 1630, '45, '51, '69, 1762, '75, '77, '87, '89-90, '94, 1801, 1945

Aristotle: analyzed logic, induction, deduction, basic laws of thought. His scientific ideas (including his errors) dominated Western science for c. 2000 years. Some Quotes: “The state is by nature clearly prior to the family and to the individual, since the whole is of necessity prior to the part.” “There exists in nature a principle of leadership and rulership. . . but no principle of dictatorship.” 1300 BC-golden rules, 450BC-*Design Argument*, 425 BC-slavery is unjust, 399 BC-Socrates, 387 BC-Plato, 335 BC-science, 300 BC-*Problem of Suffering*, 270 BC-geocentric view, 58 BC-Lucretius, 44 BC-Cicero, AD150-geocentric view, AD 230-Neo-Platonism, AD 413-Augustine, 524-Boethius, 529-Justinian closed Aristotle's Lyceum, 549-Philoponus corrected two Aristotle ideas, 850-al-Sabi rejected Aristotle's belief that there is a “purpose” in natural events, 910-Al-Razi critiqued Aristotle, 1008-Biruni corrected Aristotle, 1020-Al-Haytham corrected Aristotle's optics, 1085-Toledo library, 1140-Gratian, 1150-ibn Rushd, revived Aristotle and Averroes, 1190-Maimonides, 1209-Aristotle dominated science-Paris, 1217-Averroes revived Aristotle, 1269, 1273-Aquinas merged Aristotle Christianity, 1270, 1277-Bishop Tempier banned Aristotle's ideas, 1324-Marsiglio, 1331-Ockham, 1483-*Historia Plantarum* in Latin, 1487-da Vinci criticized some Aristotle ideas, 1500-Scholastics relied on Aristotle, 1514-Mantius published Aristotle's works, 1516-Aristotle ideas became Christian dogma, 1517-Luther hated Aristotle, 1543-Copernicus rejected Aristotle's geocentrism, 1577-Brahe saw an Aristotle celestial error, 1592-Galileo corrected Aristotle errors on motion, 1661-Boyle rejected Aristotle's view that logic enough to prove something, 1676-Roemer, 1687-Newton, 1710-Leibniz, 1819-Schopenhauer

Aristotle's errors: 335 BC

Aristotle's four causes in science: material,

formal, efficient, and final. 335 BC

Arius: led Arians: early Christian sect. AD 325

Arjuna: Hindu prince in the *Bhagdad Gita*. 400 BC

Arnould, Antione: *The Art of Thinking*. 1650

Arnould: Cisterian abbot: slaughtered Cathars. 1208

Armature: rotating part of an electric motor
dynamo, consisting of coils of wire

Art of Love, The: Ovid. c.AD 8

Artemis: Greek goddess of the hunt. 750 BC

US Articles of Confederation: established a weak
federal government, ratified in 1781

Artificial selection / eugenics, human controlled
breeding to improve a species, 1859, 1899

Aryabhata: Hindu polymath, calculated pi. 499

Al-Shirazi, Qutb al-Din: astronomer, 1307, p.394

Ashurbanipal: 1500 BC, 669 BC, 586 BC, 1849, 72.

Asimov, Isaac: American polymath, scientist, 1982

“Ask and ye shall receive:” Jesus’s promise to give
believers what they ask for. AD 70-90, 1517,
Reasons prayers aren’t answered p. 416

Asoka: great emperor of India. 325 BC

Astrochemistry: study of planets and stars thru
spectroscopes. 1859

Astrolabe: device to measure the angle of Polaris above
the northern determine latitude, 846, 910, 1000, ‘60,
‘85, 1150, 1419, ‘50, 1761

Astrolabe: son of Abelard and Heloise, 1122

Astrology: false theory that the position of planets at
one’s birth influences one’s characteristics. 300 BC,
150, 1000, 1273

Astronomical unit / AU: distance from Earth to the
Sun, averages c.93 million miles.

Astronomy: the study of the heavens,
Astronomy Timeline, pp. 433-440

Atahualpa: Incan emperor, killed by Pizarro.

Ataturk, Mustafa Kemal: (1881-1938), revolutionary
and modernizer of Turkey. 1532

Aten: first posited monotheistic God. Egypt. 1370 BC

Atheism: absence of a belief in a god. Soft atheism (no
evidence of a God) and hard atheism (an affirmative
denial a God exists). Some scholars have identified
several variations of atheism within the overall
definition. Atheism *per se* does infer any ethical code.
The atheist said, Think how many millions or
billions have been slaughtered simply because
some group believed their God told them him to kill
another group across the river who had a different
God who was telling them the same thing. Hans Kung
(1928-2021), an eminent Swiss priest / theologian, called
the *Problem of Evil* The Rock of Atheism 2000 BC, 528
BC, 510 BC, 425 BC, 387 BC, 58 BC, 870- Al-Rawandi,
1060-Al-Zarqari, 1273-Aquinas-Kill atheists, 1473-
Lucretius, 1517-Luther, 1600-Bacon, 1616-Bellarmino,
1670-Spinoza, 1680-Bayle, 1686-Halley, 1689-Locke-

Toleration (but not for atheists), 1696-Bayle, 1730-
Tindal, 1751-Diderot, 1759-Voltaire, 1761-d’Holbach,
1790-Burke, 1811-Shelley, 1820s- Bolivar, 1860-
Wilberforce, 1869-Huxley, 1880-*Grand Inquisitor*, 1886-
Leo 13- “Toleration is atheism” 1896- Andrew D
White, 1905-Santayana, 1943-Sartre, 1955-Mackie,
1973-Dawkins

Athena: Greek goddess of wisdom, outrage. 750BC

Atkins, Peter W, Brit, chemist, *10 Great Ideas*,
“Religion utterly failed to provide an explanation of
the biosphere other than that God made it all’. Then
Darwin thundered over the horizon and in a few
decades of observation and thought. . . arrived at an
answer.” 1823, 1900, pp. 439, 58

Atom: The smallest unit of an element, the basic building
blocks of all matter. The definition of "atom" has
changed over time in response to scientific
discoveries. In the 5th century BC, it referred to a
concept of there is some fundamental tiny particle of
matter that could not be divided.

In the 17th century, it referred to being the basic
particles of the chemical elements.

Then chemists saw elements combined with each
other in ratios of small whole numbers.

Then physicists discovered that atoms had an
internal structure made up of even tinier sub-atomic
particles The *Standard Model of Particle Physics* was
compiled in the 1970s. Atoms’ sub-atomic particles
are protons, electrons, and neutrons, which are made
up of even tinier elementary particles, all called sub-
atomic particles. The primary sub-atomic particles
(protons, neutrons, electrons) were discovered
between 1897 and 1932. Atoms have a tiny dense
nucleus of protons (with an electrical plus charge)
and neutrons (except hydrogen which has only one
proton) surrounded by a huge space where much
tinier electrons (with minus charges) orbit the
nucleus. Atoms have the same number of protons and
electrons. Electrons are in the lepton particle family
and are elementary particles themselves. (i.e., no
known sub-components.)

Protons and neutrons (baryons) are themselves made
up of particles called quarks, which are
elementary particles (considered indivisible and not
made up of smaller particles).

There are three different types of quarks. (Quarks
have sub-particles with electric charges. *Known
elementary particles are Quarks (36 types),
Leptons (12 types), Gluons (8 types), Photons
(one type), Z Bosons (one type), W Bosons (two
types), and Higgs Bosons (one type). These
elementary particles can combine in different ways to
make other composite sub-atomic particles. Quarks
and leptons have anti-particles, same mass but an

opposite charge. Hadrons are composite particles divided into two families: baryons, made of three quarks, and mesons, made of one quark and one antiquark. Quarks comprise the nuclei of atoms. Particles arise from something more fundamental: fields. When fields form a wave, a particle is born. The Higgs field gives mass to all matter.

A quark that is part of a liquid is the same as a quark in a solid or a gas. All known hadrons (the particles that experience the strong nuclear force) could be constructed out of simple combinations of three particles, quarks, and their anti-particles. The fundamental forces and their fields are:

1. The nuclear force (gluon field, holds together the protons and neutrons (the nucleus of atoms).
 2. Electromagnetism (photon field, gives rise to electric and magnetic fields)
 3. Weak nuclear force (W and Z fields, cause radioactive decay .
- For comparison, One could line up about 10 cells next to it, or 100 bacteria, or about 1000 viruses. 450 BC, 430 BC, 425 BC, 335 BC-Aristotle.

Atomic bomb: plutonium nuclear fission bomb. Harry Truman: "An atomic bomb is the harnessing of the basic power of the universe." 1945

Atomic number: number of protons in an atom, It determines what element it is. 1869, 1913-14

Atomic Theory: all matter is made up of tiny atoms. Leucippus and Democritus formulated the theory, but it was not proven for 2,000 years. They thought atoms were indivisible. 450 BC, 430 BC

Atomic weight: sum of protons, neutrons, and electrons in an atom. Some elements like carbon and have "isotopes" i.e., different numbers of neutrons, thus different atomic weights. 1819, '60, '69, 1914

Attenborough, David, Sir: Brit, naturalist. 2019, p. 411

Attila the Hun: chief of Mongolians, a dwarf, 475

Attis: a god in Syria, reputedly resurrected 2400BC

Attraction: any force that tends to pull objects closer
Forces include electrostatic, gravitational, magnetic and inter-molecular forces.

Augustine, St.: Doctor of the Church, *Confessions*, *City of God*, *Free choice of the Will*. Quotes: "He that is good is free, though he is a slave; He that is evil is a slave, though he be a king." "Just as there is in the human soul. 300 BC-*Problem of Suffering*, AD 150-reading, AD 355-said many sects, 413-*Problem of Suffering*, 414-paradoxes, 476-universe is static, 1076-Anselm, 209-Aristotle, 1269-Aquinas and Aristotle, 639-Two cities

Augustinian Golden Age: 150 BC

Authority: Thomas Szasz, Revolt against authority is the classic crime of the individual. 1748

Averroes, ibn Rushd: pre-eminent Muslim scientist, scholar. p. 2, 1000, 1150, '60, 1217, '77, 1331,

1687-Newton, 1714, '19

Avicenna / Abu If ibn Sina, mathematician physician, *Book of Healing*, *Canon of Medicine*. 1000, 1085, 1150, 1225, 1527, 1590, 1687-Newton

Avogadro, Romano Amadeo, Atoms combine into molecules. "All gas atoms and molecules are the same size; accepted after he died. 1811, '60

Ayer, Alfred-Jules: linguist, logical positivism, *Language, Truth, and Logic*. 1637, 1936

Aztec civilization: Mexico. p. 1, 6000 BC, 2000 BC, AD 250, 476, 1500, '19, '32

B

Baade, Wilhelm Heinrich Walter: astronomer. Galaxies are twice as far away as previously thought. 1952

Babbitt: by Sinclair Lewis, social criticism, wrote of small town narrow-minded mentality. 1918, '20

Babylonian Captivity (of Jews). c600 BC

Babylonian Captivity:(of the papacy) 1305-77, when popes lived in Avignon. 1305

Bacon, Francis: Lord Chancellor, *The Advancement of Learning*, 1605- *Novum Organum*, 1620- *Essays*, 1625- Knowledge is itself (God's) Power, "Nothing is terrible, except fear itself." "Custom is the principal governor of man's life." "Wives are young man's mistresses, companions for middle age, and old men's nurses." "Histories make men wise; poets witty; the mathematics subtle; natural philosophy [science] deep, moral grave; logic and rhetorec able to contend." 1486, 1532, '83, '97, 1600, '05, '33, '37, '86-7, 1739, 1975, 2015,

Bacon, Roger: *On Experimental Science*.

1268- *Compendium Studii Philosophiae*, 1271-*Opus Majus*. 1198-99, 1217, '43, '47, '52, 1267-68, '71, '77

Baha'i faith: originated in Islam, stresses the unity of mankind under God. 1300 BC, 1844

Baker, Russell: Sport is the opiate of the masses.

Bakhtiari: Stone age nomads, live in remote mountains in Iran. Nothing in their lives is new. 40,000 BC

Bakunin, Michael: influential Russian revolutionary. Founder of collective anarchism, "Religion has always sanctified violence and transformed it into right." "Christianity is the complete negation of common sense and sound reason." "All law has for its object to confirm and to exalt into a system of exploitation of the workers by a ruling class." Religion is collective insanity." p.2, 1532, 1851

Balance of Power theory. 1750

Balfour, Arthur: 1893, 2000, p. 406

Ball, John: priest, a leader in English peasants' revolt, murdered by King Richard. 550, 1381

Ballard, Robert: found 100 foot chimneys in the deep Pacific with bacteria in intense heat. 1975

Balloon: light gas-filled object, 1783, 1852, '60

de Balzac, Honore: *The Human Comedy*, 1847

Banks, Joseph: collected thousands of new species sailing with Captain Cook. 1768-71

Bardeen, John, transistor, p. 433

Barere, Bertrand: French revolutionary. 1792[

Barker, Dan: "Scientists do not join hands every Sunday and sing "Yes, gravity is real! I know it is real! I will have faith! I believe in my heart that what goes up, up, up must come down, down, down. Amen!"

Barometer: measures atmospheric air pressure. i.e., the weight of air above a specific patch of land. Descartes designed one. Gasparo Berti probably built one c.1642. Evangelista Torricelli built one in 1643. '54, '87

Baryon: a particle of 3 quarks. See Atom, this Index

Baryonic matter: protons, neutrons, and electrons

Basil, Saint: bishop of Caesarea. 370

Battery: electric, Alessandro Volta. Device that converts chemical energy into electrical energy. Most batteries consist of a series of electric cells and provide a source of direct current. 1710, 1800, '07 pp. 465, 467-8, 471

Ibn Battuta: Arab, went to Hindustan, China. 1325

Bayle, Pierre: French *philosophe*, wrote *Historical and Critical Dictionary* to "destroy the vices of religion. p. 2, 1680, '85, '97, 1700

Beard, Charles: *An Economic Interpretation of the Constitution of the U S*, described the economic interests, and thus the possible motives of the writers of the *Constitution*. 1913

Beaudelaire Charles: acute social critic. 1848

de Beauvoir, Simone: existentialist. *The Second Sex*. "There is only one solution if our old age is not meant to be an absurd parody of our former life, and that is to go on pursuing that give our existence a meaning - devotion to. 1943, '66, p. 416

Beaverbrook, Lord, Brit., press lord, fascist. 1933

Bebel, August: German socialist, critical of Christianity. "Anti-Semitism is the socialism of fools." "All political parties, all matters of right are at bottom only of might." 1881

Beccaria, Cesaer: *Crimes and Punishments*. Influential penal system reformer. 1764

Becker, Carl: historian, a founder of the school of history. 1909, '13

Beckert, Sven; (and *Cambridge History of Capitalism*) said Slavery was the most important engine of capitalism and economic growth in the 18th and 19th centuries. 2014

Becquerel, Alexandre: photoelectric effect. 1839

Becquerel, Antione: (with the Curies), radiation. 1896-8

Bede, the Venerable: English monk. 731

Van Beethoven, Ludwig: "Music is a higher revelation than philosophy." 1795-1830, 1933

Behaim, Martin: German, made the first terrestrial globe; it did not depict the Americas. 1492

Behaviorism / behavioral psychology: Otto Neurath (1882-1945) and Rudolph Carnap (1891-1970) performed analyses to show that the mind and other non-observable and non-scientifically verifiable objects did not exist, and that those things we thought were immaterial could be constructed from completely material objects and processes. His view declined due to the rise of cognitivism in the 1950s advocated by Noam Chomsky. 1913

Behaviorist: one who restricts psychology to objective observation, ignoring introspection and consciousness.

Behe, Michael: *ID theory*, irreducible complexity, 1996

Being and Time / Sein und Zeit: Martin Heidegger. 1927

Believing Brain: The, Michael Shermer. 2011

Bell, Alexander Graham: Scottish American, with Emile Berliner, perfected the telephone. 1876

Bell, Jocelyn: found a new type of star in 1968, distant, dense, and spinning, a pulsar. 1968,

Bellarmino, Roberto Cardinal: important Catholic theologian, Galileo and Bruno, 1600, 1615-6

Belon, Pierre: in 1555 described the basic skeletal similarities of all mammals, whales to mice. 1555

Benedict 13: Pope in Avignon. 1409

Benedict 14: Pope, against enslaving converts. 1492

Benedict 16 / Cardinal Ratzinger: pope from 2008-13. 1937, 66, 2000

Benedict, St: founded Benedictines. "To work is to pray." wrote *Rules for Monasteries*. 520

Benedict, Ruth; Different customs and standards of social behavior arise in different cultures. 1934

Bentham, Jeremy: *Introduction to the Principles of Morals and Legislation*, utilitarianism. Every law is an infraction of liberty. 1789, 1859

Beowulf: English national epic, written c.900. 1200

Bergson, Henri: French, popular philosopher, posited the false concept of an *elan vital*. 1907

Berkeley, George: "*Esse est percipi*, To be is to be perceived." "I have no reason for believing in the existence of matter." All matter is in the mind of God. (Samuel Johnson kicked a stone and said, "I refute it thus.") "Rebellion, even against a tyrant, was contrary to God's will." 1633, 1710, '81

Berliner, Emile: improved Bell's telephone, in 1877, became Bell's chief engineer. 1877,

Bernard, Abbot of Clairvaux: persecuted Abelard. 'Man is nothing but a fetid sperm, a sack of dung the food for worms. . .You have never seen a viler dunghill." 1000, c.1140, 1146

Berners-Lee, Tim: developed the world-wide Web. 1988

Bernoulli, Daniel: physicist, *Bernoulli Principle*. 1738

Bessel, Frederick: measured the distance to the star 61 Cygni

61 Cigni using parallax. 1838

Beta decay: Pierre and Marie Curie. 1896

Bethe, Hans: hydrogen atoms in the Sun fuse, lose a tiny bit of matter/energy, sunlight. 1936, '38

Beverluis, John, philosopher. Refuted C S Lewis.

Beyond Good and Evil: Nietzsche. 1886

Bhagavad Gita: Hindu holy scripture. 400 BC

Bias: Any predictable error that inclines one's judgment in a particular direction. Many mentions herein

Bible, The: The holy scriptures of Christians. (77% of the *Christian Bible* is *The Hebrew Bible / Old Testament*). Originally in Aramaic, Greek, and Hebrew. The official Bible, the *Vulgate Bible*, is in Latin. Ira Gershwin: "It ain't necessarily so. The t'ings dat you li'ble To read in the *Bible*. It ain't necessarily so." Many mentions herein.

Bierce, Ambrose: *Devil's Dictionary*, insightful skeptical iconoclastic definitions. Patriot: n, The dupe of statesmen and the tool of conquerors. Irreligion, n The principal one of one of the great faiths of the world."

Big Bang / Dynamic Evolving model of the universe posited by Lemaitre in 1927. The universe began with an explosion from a single point. 1927, '50, '53, '61, '64, '92

Bigotry, see Prejudice

Bill of Rights, U S: principal authors, Madison and Mason. 1789

Biology: Science of physical life. Cells are the basis of living things. 800M BC, 600M BC, 7M BC, 330K BC, 200K BC, 2700 BC, 1673, 1735, '49, '66, '70s, '94, 1802, '09, '28, v '30, '31-2, '38, '44-5, '55, '58, '60, '71, '77, '82, '99-1900, '25, '35, '53, '75, '96

Birds, The: Aristophanes, satire. 425 BC

Al-Biruni, Mohammed ibn Ahmad: astronomer, speed light is finite. 1000, 1242, 1514, 1609

von Bismark, Otto: unified Germany, 1870-75

Black, Hugo: SC Justice, "The wall between church and state must be high and impregnable." 1947

Black Death/bubonic plague: ravaged world 1347-51

Black hole: an area in space whose gravitational pull is so strong that it attracts and engulfs all matter within its sphere, including all electromagnetic / light waves. 1783, 1796, 1850, 1915-7, "74, '82, 2015, pp. 411, 429, 434-7)

Black, Joseph: isolated CO₂, said air is a mixture of gasses. c.1755,

Blackburn, Simon: professor, atheist, One man's revelation is another man's heresy, *Think*. 1748,

Blacks / Negroes: 540 BC, 1765, 1830, '70, 1978

Blackstone, William, Sir: Brit, eminent Jurist. Rationalized law in the English speaking world. "It is better than ten guilty escape than one innocent suffer." 1759, '76

Blake, William: Brit, poet. "All Penal Laws court transgression and therefore are cruelty and murder. 1892

Blasphemy; original definition: Sacrilegious talk about God or sacred things. *The Bible* and *the Qur'an* ordered death for blasphemers; Medieval definition: criticizing the law or public order. Current definition: includes someone's feelings about religion. Blasphemy laws have been abolished in England, Ireland, Denmark, the Netherlands, Iceland, Norway, and New Zealand.

Blood: carries oxygen to the cells in a body. 35K BC, 335 BC-Aristotle, 476, 1150, 1242, 1553, '55, 1603, '28, '61, '73, 1864, 1901

Blueshift: the visible portion of the electromagnetic spectrum of a star or galaxy approaching a viewer appears bluer. 1912, 1917

Board of Longitude: British. 1714

Boas, Franz: father of anthropology. 1887, 1906, '29

Boccaccio, Giovanni: *Decameron*. 352, 1454, 1512

Bodin, Jean: *De Republique*, state sovereignty. 1586, 1609

Boethius: As far as possible, join faith to reason. 524

Bohr, Niels Hendrik: *On the Constitution of Atoms and Molecules*, structure of the atom, said electrons orbit the nucleus in specific orbits. "There are trivial truths and the great truths. The opposite of a trivial truth is plainly false. The opposite of a great truth is also true." 1913, '23, '27, '33

Boiling point: temperature where the vapor pressure of a liquid reaches that of the surrounding gas or vapor. The liquid then becomes a gas, 212F or 100C at sea level. Lower atop a mountain.

Boleyn, Anne: 2nd wife of Henry 8. He killed her. Mother of Queen Elizabeth. 1533

Boiling point: temperature when a liquid turns into a vapor throughout its bulk. The vapor pressure then equals the external pressure on it.

Bolivar, Simon: an *Enlightenment* man, liberator of South America, banned inquisitions, became an atheist, so excommunicated. 1820s, 1867

Bolton, Charles: proved black holes existed. 1972

Boltwood, Bertram: concept of radioactive decay tells the age of matter. 1907

Boltzmann, Ludwig: entropy, thermodynamics. 1877

Bonaparte, Napoleon: If you wish to be success in the world, promise everything, deliver nothing. In politics... never retreat, never retract... never admit a mistake. 1532, 1793, '95, '98-99, 1804-8, '12-14, '15, '32-4, '41, '65, 1937, p. 398, p. 1800 in electro-timeline.

Bond, chemical: a chemical link binding elements. , 1948; 1992. 1948, p. 435

Bonfire of the Vanities: Savonarola, Florence. 1494

Boniface 8: corrupt pope, gave papal lands to his family. 1300

Book of Animals: al-Jahiz. 820,

Book of Healing: Avicenna. c.1000

Book of General Laws and Liberties of Massachusetts Colony: It mainly codified the *Old Testament*. 1648

Book of Mormon: Joseph Smith. 1830

Book of Plants: al-Dinawari. c.880

Book of the Emerald: Ibn al-Rawandi, ridiculed foolish Muslim beliefs. c.870

Boorstin, Daniel: (1914-2004) U.S. historian. 1473

Borelli, Giovanni: astronomer. 1684

Borgia, Cesare: son of Alexander 6, corrupt. 1493

Borgia, Lucretia: daughter of Pope Alexander 6, her husbands disappeared after they outlived their political usefulness to Alexander. Said, "My husbands have been very unlucky."

Born, Max: a wave is a wave of probabilities.

"Science is so greatly opposed to history and tradition that it cannot be absorbed by our civilization." 1926

Boson: an elementary particle. See Atom, this Index

Bossuet: bishop, against heliocentrism. 1702

Botany: science of plants. 27K BC, 390 BC, AD 83, 880, 1085, 1486, 1694, 1768, 79, 1832, '38, '60, 1900

Boulton, Matthew: ironmaster. 1765

Le Bourgeois Gentilhomme (1670), Moliere. 1664

Boyer, Pascal: 2002

Boyle, Robert: chemist, Irish, described the law of gasses. Double the pressure, halve the volume. 1661-63, '66, '89, 1783, 1802

de Brabant, Siger: philosopher at the Univ. of Paris, led students of Averroes who had taught Aristotle without reference to the Christian God, argued that reason was more valid than revelation. 1277

Bracciolini, Poggio: a papal secretary, discovered Lucretius's atheistic *On the Nature of Things* in a monastery in 1417, it was printed in 1473, so became widely known. 1473

Bradlaugh, Charles: atheist, Parliament refused to seat as he wouldn't swear on the *Bible*. 1880

Bradley, James: calculated the speed of light. 1729

Bradley, Omar: US five star General, "We have grasped the power of the atom and rejected the *Sermon on the Mount*." 1948

Bradley, Raymond: refuted Plantinga. 2007

Brahe, Tycho: Danish astronomer. 1572, '77, 1609

Brahma: Hindu creator. 2000 BC,

Brahmagupta: Indian, showed how to calculate planets' orbits, described how to apply decimals to whole numbers and fractions. 628

Brahmins, ruling caste of Hindus, promoted the caste system to maintain their privileged status, 2000 BC,

1775 BC, 600 BC, 528 BC, 25 BC, 150

Brandeis, Louis: US Supreme Court Justice, "Those who won our independence . . . valued liberty both as an end and as a means." "The makers of our Constitution sought to protect Americans . . . They conferred, at least the government, the right to be let alone- the most of rights and the right most valued by civilized men. 507 BC, 1921, '41, p. 466

Branden, Nathaniel: ideas are hierarchal; using an implies that one accepts its bases. 1964

Brattain, Walter, transistor, p. 433

Brave New World: Aldous Huxley, (Title taken from Shakespeare's *Tempest*). 387 BC, 1532, 1932

Brethren of the Common Life: Dutch religious brotherhood, simple living, secular holy men, Erasmus attended. 1389, 1509

de Broglie, Louis: Matter acts as electromagnetic waves and as particles. 1924

de Broglie wave: in wave mechanics, a wave or wave group associated with a moving sub-atomic particle. 1924

Bronowski, Jacob: re Auschwitz, "This is how men behave when they believe they have absolute knowledge. In *The Ascent of Man*, he wrote, "That is the essence of science: ask an impertinent question, and you are on the way to the pertinent answer." p. 1, 200,000 BC, 1927, 1972, pp. 398, 439

Bronze Age: bronze is a copper/ tin alloy, two soft metals make bronze, a hard metal, then came The Iron Age. 3000 BC, 1200 BC, 450 BC

Brooks, Mel: (1926-) Philosopher. "It's good to be king." Tragedy is when I cut my finger. Comedy is when you walk into an open sewer and die."

Brown, Robert: botanist, Brownian motion. 1826, 1905

Brugnatelli, Luigi: developed electroplating. 1805

Bruno, Giordano: priest."Truth does not change because it is, or is not, believed by a majority of persons." He was tortured and murdered by the Catholic Church. 1576, 1600, '33, '44

Brutus: Roman senator, and others, killed Caesar. 44 BC

Bryan, William Jennings: twice Democratic candidate for president, believer, "One miracle is just as easy to believe as another." 800,'96, 1925, 1974, 2011, pp. 413, 439

Bryson, Bill: *A Short History of Nearly Everything*. Three stages in scientific discovery. Deny that it is true, then deny that it is important; finally credit the wrong person.

Bubonic plague: killed 1/3-1/2 Europeans. 1347-51

Buchanan, George: Kill bad rulers. 1579

Buckley, William: leading American conservative, Said the white race was the more "advanced" race, and as such, the most fit to govern.1957

Buddhism / Buddhist: Indian atheistic ethical doctrine

developed by Siddhartha Gautama. *Book of Golden Precepts*: To live to benefit mankind is the first step. It has no central administrative body that governs all Buddhists. 20K BC, 300 BC, c528+, 350 BC, AD 45, AD 83, AD 100, AD150, 604, 1060, 1258, 1875, 1903, '05

de Buffon, George le Clerc: evolutionist. 1749, '78, 1859

Bunsen, Robert: spectroscope 1859, 1914

Burbank, Luther: pre-eminent botanist. "Science is knowledge arranged and classified according to truth, facts, and the general laws of nature." 1900

Burke, Edmund: father of modern conservatism. "All that is necessary for the triumph of evil is that good men do nothing." *A Vindication of Natural Society* (1775), *Reflections on the Revolution in France* (1790). *Speech to the Electors of Bristol*. 1756, '70, 74-5, '90, '92

al-Bukhari, Mohammed Sahih: compiled hadith. 846

Burr, William: *Self-Contradictions in the Bible*. 1860 U S

Bush, George H W (1924-2018), US President, said, "I don't know that atheists should be considered as citizens, nor should they be considered patriots."

Bush, George W, US president, favored Creationism, claimed to speak with God, opposed stem cell research. Was Skull & Bones at Yale, Harvard MBA. 1986, pp. 133, 417

Burton, Robert: Anglican, skeptic. 1532

Butler, Smedley: US Marine general. I spent 33 years as a high-class muscleman for Big Business. 1931

C

Caboto, Giovanni /John Cabot: Venetian, and son Sebastian, explored North America for Henry 7 of England. seeking a Northwest passage to Asia. 1497

Caccini, Tommaso: Dominican, anti-Galileo. 1614

Calculus: any system of rules for symbolic manipulations. Differential calculus is concerned calculating the rates of change of functions, by Newton and Leibniz at same time. 825, 1633, '61, '65-6, 1687-Newton, 1736, '96

Caesar: (means dictator) 65 BC, 50 BC, 44 BC

Caisphas: Jewish high priest in Jerusalem, said to have Jesus accused of blasphemy and crucified by Pontius . AD 30

Calendar, Jewish: dates from 3671 BC; Egyptian-3500 BC, Babylonian-3200 BC, Julian-50 BC, 1513, Islamic-622, Gregorian-1582,

Caligula: Roman emperor. 1st century AD, 1493

Calixtus: corrupt pope, uncle of Alexander 3. 1493

Callicles: The more able should rule. c.370 BC

Caloric: substance once thought to be heat. There is no such substance. 1798, 1823

Calorie: the unit of heat in the CGS (centimeter, gram, second) system. 40K BC, 1843

Calvin, John/ Jean Cauvin: founded Calvinism, rejected all doctrines not found in the *Bible*, developed the concept that one's afterlife fate, i.e., Heaven or Hell, was predestined, wrote *Institutes of Christian Religion*. Geneva, strict. 1525, 30s-'60, '36, '53, '60, '72, 1748, 1918

Calvinism: a form of Protestantism emphasizing the predestination of everyone. 1525, '36, '41

Camerarius, Rudolph: *Epistola de Sexu Plantarum* said plants reproduced sexually. 1694

Campbell, Joseph: *The Power of Myth*. 1943

Camus, Albert: "Property, gentlemen, is murder." Don't wait for the last judgment. It takes place every day." "I rebel, therefore I am." 1955

Candide: by Voltaire, satirized Leibniz. 1759

Cannizzaro, Stanislao: chemist, made Avogadro's 1860

Cape Bojador / Bojadour, 1434, '52,

Capella: Martianus, Carthage Proconsul, wrote about seven liberal arts, rhetoric, grammar, geometry, Astronomy, , argument, music, arithmetic. c.410

Capitalism: economic theory based on private property and free enterprise. Chomsky: "Capitalism is basically a system where everything is for sale. Freedom is one of the commodities that is for sale. If you are affluent you can have a lot of it. Thomas Piketty, an eminent French economist, with over a hundred of years of statistics, found inherited wealth increases faster than wealth from labor. Thus inevitably increases the inequality in a capitalist society. 1776, 1820s, '67, 1904, '33, 2013

Carbon: the basic element in all organic compounds.

Carlin, George, "Think of how stupid the average person is, and realize half of them are even stupider."

Carlyle, Thomas: Rector, Univ. of Edinburgh. "Democracy is, by the nature of it, a self-cancelling business and gives in the long run a net result of zero. "What is knowledge too but recorded experience, and a product of history, of which, therefore, reasoning and belief, no less than action and passion, are essential materials. 1840

Carnap, Rudolph: Behaviorism. 1928

Carneades: skeptic, led Plato's Academy. "There is absolutely no criterion for truth. For reason, senses, or whatever else may exist are all deceptive. 150 BC

Carnegie, Andrew: U S steel baron and philanthropist "The man who dies rich dies disgraced." 1870s

Carnot, Sadi: founded thermodynamics. 1824, '47

Carter, Jimmy: US president. left the Baptist religion because of its sexism. 2009

Carson, Johnny: on the success of a comedy sketch,

“You buy the premise, you buy the bit.” 1779.

Carter, Brandon: *Anthropic Principle*. 1973

Cartesian: adj. pertaining to Descartes. Cartesian dualism is Descartes's separation of mind and body. 1637, '70, '87-Newton, 1710

Carvakas: adherents of Lokayata, an ancient Indian atheistic doctrine. 620 BC, 600 BC

Casanova, Giacomo Girolamo: “Man is free, but not if he doesn't believe it.”

de las Casas, Bartolome: Dominican, *Destruction of the Indies*, advocate of Amerindian rights for 50 years. 1542

Cassini, Giovanni: director of the Paris Observatory, heliocentrism. 1672, '76

Cassius: Roman senator. 44 BC

Catalyst, a substance that speeds up interactions of molecules

Caste system, odious and false Hindu belief that one's position in life is due to one's conduct in a previous life. It is a cruel system of social control promoted by the ruling Brahmin class. Gandhi and Nehru rejected it. 2000 BC, 620 BC, 528 BC, 1532, 1800, '75, 1932, '47

Castelli: student and defender of Galileo. 1613

de Castelnau, Pierre: emissary of Pope Innocent 3 to the Cathars. 1208

Catalyst: Substance that greatly alters the speed of a chemical reaction.

Categorical Imperative, (Imperative, means without exception or qualification absolute and certain), Kant's refinement of the *Golden Rule*. 1788

Category error: comparing concepts or objects in uncomparable categories, as they are different kinds of concepts measured by different criteria. Apples and oranges. 1775 BC AD 177, AD 313, 1710, 1940, '44, '74

Cathars: peaceful Christian sect, disdained necessity for Vatican, so Pope Innocent 3 set soldiers to destroy them. 1147, '84, '98, 1208

Catherine de Medici: instructed her son, child king in France, to kill Huguenots/Protestants. 1572

Catherine the Great: Russian empress / czarina. 1733

Catherine: first wife of Henry 8, Marriage voided. 1533

Catherine Howard: fifth wife of Henry 8. 1533

Cathode: Negative electrode through which current leaves an electric cell or a vacuum tube.

Catholic: see Roman Catholic, largest Christian sect

Cato the Censor: Roman statesman, severe.

“Those who steal from private parties spend their lives in stocks & chains; those who steal from the public treasure dress in gold and purple.” 200 BC

Causality: the operation of cause and effect

Cautio Criminalis: by Frederich Spee, Jesuit, witch hunts. 1631

Caucasian Superiority /White supremacy: theory that Caucasians / Whites are superior to all other races / ethnic groups. Common belief of educated people. 335 BC, 1532, '37, 1751-Hume, 30-Mormon, 1857-Law, 1861-Civil War, 1900, 1921, '25, '33-Hitler

Cave paintings: first writings. 30K BC, 18K BC

Cavendish, Henry: isolated hydrogen. 1766, 1879

Cayley, George: Brit, flew a manned kite. 1853

Cell: the smallest independent part of a living organism, made up of millions of atoms. Cells's characteristics:

They split into two cells (mytosis). They differ widely in size and shape depending on their function. All contain water. About 99% of all living matter is made of carbon, hydrogen, oxygen and nitrogen. They contain about chemical elements and about 20 amino acids. Proteins are made from amino acids. Cell membranes contain protein molecules. Cells's immediate source of energy is adenosine triphosphate (ATP). Enzymes are the chemical catalysts of living cells.

Cell Theory: all tissues and organs, including the nervous system, are cellular in structure, cell theory is the basis of biology. 1665, 1860

Cellini, Benvenuto: sculptor, goldsmith. 1512

Cellular Pathology: Rudolf Virchow. 1858

Celsius/ Centigrade: measure of temperature, 1 Celsius degree= 1 Kelvin degree = 1.8 Fahrenheit degrees. 1802, '46, '60

Centrifugal force: fictitious force that appears to act on a body moving on a circular path. It is simply the inertia of the moving body seeking to go straight in Newtonian physics. 440 BC, 1656, '83,1970.

Centripetal force: force that acts inward on an object moving on a circular path. Gravity is the centripetal force causing astronomical bodies to orbit a larger body. 1656, 1914, '16, p. 435 1605

Chadwick, James: discovered neutrons. 1932

Chadwick, Edwin: former secretary of social reformer Jeremy Bentham, Utilitarian. 1842.

Chain of Being: 387 BC, 335 BC-Aristotle, 1450, 1689, 1789

Chambers, Robert: evolution is directed by God. 1844

Chamberlin, Neville, (1869-1940) British PM, in 1938 asked Hitler what more lands he wanted. Hitler said, the Sudetenland. 1938

de Champeaux, William: teacher of, then lost to Abelard in debate. 1121

de Chancourtois, Alexander: saw patterns among elements before Mendeleev. 1869

Chanson de Roland: French national epic poem, c.1200

Chaplin, Charlie / Sir Charles Spencer Chaplin, comic genius, world famous actor, and philosopher,

- during the U S Red Scare of the 1950s, was stupidly prevented from entering the United States for his political views
- Charge: (electricity) the amount of unbalanced electricity in a system: either positive or negative.
- Charles' law: At constant pressure, the volume of a gas is proportional to its absolute temperature, i.e., its temperature on the Kelvin scale, the higher the temperature, the greater the volume.
- Charlemagne: emperor of the Holy Roman Empire (HRE), illiterate, he collected scholars; unsophisticated, he established a legal system; not religious, he promoted Christianity to assist his rule. 787, 799-800, 814.
- Charles 1: English king, beheaded by Cromwell. 1649
- Charles 5: HR Emperor: Diet of Worms: 1517
- Charles 9: French child king, at 12, ordered the St. Bartholomew's Day Massacre. 1572
- Charles, Jacques: Heat expands gasses. 1787
- Charron, Pierre: priest, skeptic, *The Three Truths*, De la Sargesse. 1594, 1601
- Chase, Stuart: *Tyranny of Words*, 1779, 1938, '45
- du Chatelet, Emilie: French noblewoman, scientist, patron of scientists, mistress of Voltaire. 1735
- Chaucer, Geoffrey: (c 1340- 1400) "All things obey to money." 1400
- Chemical bond: chemical link between elements.
- Chemical Bond, The Nature of the*: Linus Pauling: most cited science text. 1939
- Chemistry: 780, 1317, 1624, '61, 1709, '75, '66, '75, '83, 1840, '69, 1900, '34-5, '39, '53
- Chemical formula: tells the ratio of elements in a substance. H₂O is two hydrogen atoms and one oxygen atom.
- Chemerinsky, Erwin: Law school dean, criticized the "Originalism" legal theory. 1980s
- Cheops: Egyptian pharaoh, The largest pyramid is the Great Pyramid of Cheops. 2630 BC
- Chesterton, G K: writer, "If I can put one touch of rosy sunset into the life of any man or woman, I shall feel that I have worked with God." "Science must not impose any philosophy, any more than the telephone must tell us what to say." (Example of a bad analogy) p. 447
- Chibisov, G. V.: quantum fluctuations. 1981:
- Chloride: the salt of hydrochloric acid.
- China / Chinese: Over 70 mentions from 700K BC
- Cholera: disease spread by impure water. 1519, 1854
- Chomsky, Noam: prominent linguist and philosopher. The structures of most languages are similar, i.e., subject-verb-object. So there's a innate mental universal grammar. (But it seems that the most important subject of any thought or sentence will be said first no matter if the mind is "hard wired."). 1975
- Chosen people: a delusion by held by Jews, Christians (*Colossians 3:12, John 15:16, 1 Peter 2:9*), Mormons, Rastafari, Jehovah Witnesses, Seventh Day Adventists, the Japanese, the Unification Church, that God favors such believer's religion over others. Calvinists call it "God's elect."
- Chou Dynasty: 530 BC
- Chou En-Lai: Chinese communist leader. All diplomacy is a continuation of war by other means.
- Christ: (Greek Christos, the Anointed One), Jesus: Numerous mentions herein.
- Christianity: those sects/religions that worship Jesus as God. Numerous Christian sects with differing beliefs arose in the 1st century AD. It became the dominant, then official, religion of the Roman Empire in the 4th Century AD. When the political structure of the Roman empire fell, the Church became the only organization of the empire. The Western part of Christianity centered in Rome/ The Western Rome-based Christian Church rose in world after 1492 as it was the dominant or only the church of the world's conquerors.
- Several Christian Protestant sects were founded in the 16th century by splitting off from the Rome-based church. *Time's Almanac 2000* reported 29 Christian sects each with over 500,000 adherents. The Center for the Study of Global Christianity says there are c. 45,000 "Christian" denominations, tiny to immense. Baptists have a multitude of sects with differing dogmas. Christian sects have different dogmas. All Christian sects profess to be the true church of Jesus Christ. Over 400 mentions.
- Christianity as Old as the Creation*: Matthew Tindal. 1730
- Christianity Unveiled*: Baron d'Holbach. 1761
- Christophorous: Vatican official who forged the *Donation of Constantine*. c735
- Christological Arguments: AD 45, p. 405
- Chrton, Michael: Consensus is invoked only in cases where the science is not solid enough.
- Chrysostom, John: anti-Semitic patriarch in Constantinople, praised by Hitler and other anti-Semites. 400, 1925
- Churchill, Winston: British statesman, 1908, "Conservative Party is not a party but a conspiracy." 1945, pp.399, 40i, 421, 510
- Cicero, Marcus Tillius: Roman Consul, statesman, prolific letter writer. *De Natura Deorum*. "Virtue is its own reward." "In a republic this rule ought to be that the majority should not have the predominant power. "The good of the people is the highest law." 300 BC, BC, 44 BC, 1339, '45, '97, 1580
- Cigni*: a star. 1838, p. 435

Cioran, E M: Beware of thinkers whose mind functions only when they are fueled by a quotation. (1991)

Circuit, electrical. The complete path taken by an electrical current.

Circular inch: a circle 1 inch in diameter. Its area .7854 of a square inch.

City of God: Augustine's defense of Christianity. 1413

Civil Liberty, On: David Hume, first use of phrase, "a government of laws, not of man." 1742.

Clairaut, Alexis: astronomer. 1687

Clapeyron, Emile: combined *Boyle's Law*, *Charles's insight*, *Avogadro's Law*, and *Gay-Lussac's law* into the ideal gas law: $PV = nRT$. 1834

Clark, Kenneth C: historian. 1397

Clarke, Arthur C: philosopher, "There is no reason to assume that the universe has the slightest interest in intelligence—or even in life. Both may be random accidental by-products of its operations like the beautiful patterns on a butterfly's wings. The insect would fly just as well without the patterns." "A faith which cannot survive collision with the truth is not worth many regrets." "Science can destroy religion by ignoring it as well as by disproving its tenets. No one ever demonstrated, so far as I am aware, the non-existence of Zeus or Thor—but they have few followers now." Throughout the earlier part of its history, the human race had brought forth an endless succession of prophets, seers, messiahs, and evangelists who convinced themselves and their followers that to them alone were the secrets of the universe revealed. Some of them succeeded in establishing religions which survived for many generations and influenced millions of men; others were forgotten even before their deaths." 40,000 BC, 1953, '56, '65, '73, '91

von Clausewitz, Karl: Prussian general. 1832-34

Clausius, Rudolph: *Second law of thermodynamics*. 1850, '77

Class Divisions in society:

Hinduism, the Caste System.

John Winthrop: Puritan governor, "In all times some must be rich, some poor, some eminent in power and dignity, others, meane and in subjection", 1630

Alexander Hamilton, the few and the many, the rich and well born, and the mass of the people."

Henry George: "The House of Haves and the House of Want."

Karl Marx: History has been the struggle between the exploiting and exploited classes, the ruling and oppressed classes.

Cervantes: The Haves and the Have Nots.

Frederick L Schuman: "All literate human societies . . . have been pyramidal or hierarchical in the

distribution of indulgences and among its members. The few enjoy maximal individual shares of wealth, income, prestige or influence . . . [E]very such society displays at the bottom of the social scale a multitude of the poor, each receiving the minimum individual shares of available satisfaction."

Adam Smith The two factions representing. "self interest and social interest.

Sociology: The social classes are: Upper Upper, (old money) Lower Upper (new money) , Upper Middle (professional), Lower Middle (white collar), Upper Lower (blue collar), Lower Lower (poor).

Classical Field Theory: A classical field theory is a physical theory that predicts how one or more in physics interact with matter through equations, without considering effects measuring effects in quanta; theories that quantum mechanics are called quantum field theories. In most contexts, field theory' is specifically intended to describe electromagnetism and gravitation.

A physical field can be thought of as assigning physical quantity at each point of space and time. Example, in a weather forecast, the wind velocity during a day over some point is shown During the day the vectors change as wind changes. The first field theories, gravitation and Maxwell's. So, classical field theories are usually categorized as non-relativistic and relativistic. (Wikipedia).

Clavius, Christopher: Catholic astronomer. 1611

Cleisthenes: Athenian, introduced democracy. 508 BC

Clemens, Samuel: Mark Twain,

Clement 2: Pope, appointed as pope by HR Henry 3. 1046

Clement 4: Pope / Cardinal de Foulkes. 1267

Clement 5: Pope, falsely accused Knights Templar, stole their property. 1306

Clement 7/ Robert of Geneva: an "anti-pope" 1387

Clement 8: Pope, burned Giordano Bruno at the stake. 1600

Cleopatra 7: consort of Gaius Julius, then Mark Anthony, killed her brother to become sole pharaoh of Egypt. 490 BC, 44 BC, 31 BC

Clergy's historic fear of ideas: 1616, '57, 1848, p

Clergy "protecting their turf" best explains their actions persecuting "heretics" 1562, p. 420

Clerk-Maxwell, James: likely the third most prominent scientist of all time, after Einstein and Newton.

Treatise on Electricity and Magnetism. Maxwell's Equations unified Said gravity is the 4th force to act across a vacuum. 1812, '55, '77, pp. 424-9, 434

Clock: c500 BC, 1000, 1300, 1590, 1633, '55-6, 1761

Closing of the Western Mind: Charles Freeman. AD 410

Clovis: Frankish king, Christian. 500

Code of Manu, The: Hindu. c.400 BC

Cognition: the forms of knowing & perceiving, such as attention, memory, perceiving (visual, tactical, aural through which we synthesize information. 1325

Cognitive: adjective for those aspects of mental life with learning or of forming beliefs.

Cognitive dissonance: the very strong tendency of people to hold onto a belief when confronted with facts refuting such belief. Leon Festinger. 1957

Cognitive revolution: an intellectual movement in the 1950s that began the "cognitive sciences" of greater communication between psychology, anthropology, and linguistics

Cohen, Morris: American philosopher. 1946

Cohn, Roy: former lawyer and mentor of Donald Trump, His motto, "Always attack, always deny everything, always declare victory."

Colenso, John: Anglican bishop, correctly said the *Pentateuch* was self contradictory, so he was excommunicated. 1865

Coley, William: doctor, immunologist, 1892

Colombo, Matteo: discovered blood circulation. 1555

Colon, Cristobal / Christopher Columbus: discovered the Americas. 1405, '92, '97, 1539, '63

Columbian Exchange: 1539

Comet: object orbiting in the solar system made of ice and frozen CO₂ Long orbits. Halley's comet's orbit is 75-76 years. 250 BC, 168 BC, 1464, 1543, '77, 1630, 1705, '58, 1996

Commager, Henry Steele: American historian. Critical of phoney "patriots." 1954

Commentariolus: Copernicus's 1514 treatise on heliocentrism. 1514

Common Sense: most influential pamphlet in American history, printed anonymously, by Thomas Paine at Ben Franklin's advice. 1776

Common Sense: Ralph Waldo Emerson, "Nothing astonishes men so much as common sense and plain dealing." John Stuart Mill, "Judging by common sense is judging by first appearances. the men who place great faith in their common sense are, without any exception, the most wrongheaded." 5000 BC, 620 BC, 335-323 BC, 1000, 1677, 1714, 76, 1869, 74, 1933, 98, p. 450

Communist Manifesto: Karl Marx and Friedrich Engels "A Spectre is haunting Europe - the spectre of Communism. . . . Let the ruling classes tremble at the Communist revolution. The proletarians have nothing to lose but their chains. They have a world to win." 1848

Compass: magnetic, 250 BC, 1000-48, 1150-1250, 1419, 1492, 1620, 1686-90

Compatibilism: the belief that determinism is compatible with freedom and moral responsibility. *Inter alia*, Hobbes and Hume agreed. AD 414, 1983, p. 414

Compendium Studii Philosophiae: Roger Bacon, condemned clerical ignorance. 1278

Complementarity theory: Bohr. 1927

Compte, Auguste: French, founder of positivist philosophy. 1830

le Compte, Lewis: Jesuit missionary in China. 1670

Concave, a concave lens is thinner in its middle.

Condorcet, Marie-Jean Antoine-Nicolas de Caritot, Marquis de Condorcet, French revolutionary, His *Jury Theorem*, as the number of people on a jury goes up, the probability of the correct answer goes up. 1779, 1795, p. 418

Condition of the Working Class in England, The, Friedrich Engels. 1845

Conduction: Heat or electricity transfer by means molecular interaction, e.g. heat passing along a metal bar. 1847, '97

Conflict of the Faculties: Kant. 1789

Confucius / Confucianism: *Analects*, Eminence is based solely on merit (except for emperor's family). 1300 BC, 620 BC, 530 BC, 340 BC, 250 BC, 136 BC, 1687-Newton, 2013

Conifer, Stephen: 2000

Consciousness; the fact of awareness by the mind itself and the world, awareness: p. 1, 5K BC, 9TH century BC, AD 80-120, 1620: 1637-Descartes, p. 196, 1761-Locke, 1765-James Watt, 1795-Fichte, 1800-Political Theory, -Hegel, 1874-J S Mill, 1900, 1907-Henri Bergson, Emma Goldman, 1950-Einstein, 2000-Moreland, pp. 398, 404,

Conservation of Angular Momentum, the Law of: a fundamental of physical law. If the resultant external torque on a system is zero, the angular momentum (rotational inertia) of a system stays constant. 1746

Conservation of Energy, Law of: in a closed system, in the conversion of energy from one form to another, like light to heat, the total energy is constant, even though some may become unusable. 1714, '38, '66, 1831, '42, '47, 1905

Conservation of Mass, Law of. Matter can not be created or destroyed. It *can* change its form. As early as 520 BC, Jain philosophy (Mahavira), stated that the universe and its constituents like matter cannot be destroyed or created. Ancient Greeks said, "Nothing comes from nothing", so that what exists now has always existed: no new matter can come into existence where there was none before. Empedocles (490-430 BC): "It is impossible for anything to come from what is not, and it cannot be

brought about or heard of that what is should be utterly destroyed." Epicurus (300 BC), "The totality of things was always such as it is now, and always will be." By the 18th century the law was an important assumption during chemical reactions by chemists like Joseph Black, Henry Cavendish, and Jean Rey. 1714, '56, '66, '75, '79, '83 '89, '92, 1905

Conservation of Mass-Energy, Law of: Einstein, 1714, 1783, 1905-Einstein's relativity combined them.

Conservation of Momentum: Descartes. 1670, '87

Conservative: political philosophy, Edmund Burke.

E L Doctorow: A philosophical conservative is someone willing to pay the price of other people's suffering for his principles. (Also said by Mort Sahl) pp. 421, 504)

Conspicuous Consumption: Veblen, 1776, 1899

Constantine, Roman emperor, promoted Christianity, AD 60, 274, 321, 325, 331, 337, 363, 392, 450, 753, 787, 1440

Constantinople: Greatest Western city for c.1000 years. In 1923 named Istanbul. 200 BC, AD 325, 337, 381, 392, 410, 450, 529, 538, 591, 718, 726, 799, 932, 1000, '46, 1150, 1300, 1400, '53-4, 1524, 1600, 2000

Contingent: not necessary, happening by chance or accident, dependent on other conditions or events or experiment.

Contrariety, Problem of. c65 BC, AD 363, c.910, 1748, pp.406-p. 407

Constitution, US: a strong but imperfect constitution of a republic with some democratic features, 1776, '87, '89, '91, 1857, 1913

Constitutions: basic governing document of a political entity. US: 1789, '91 Massachusetts, 1739 academic, 1154 Roman, 65 BC, 594, France, 1748, England, 1748, Afghanistan, 2001, 06, 09

Continental Rationalism: Reason: not experiment, is the surest path to truth, Kant and others. 1633

Convection: Heat transfer by the movement of a fluid, e.g., warm air through a house. 1803, '46

Cook, James: Captain, Brit, sailed the Pacific Ocean three times. 1768-71, and 1772-75. 1768

Cooke, William, with Charles Wheatstone: Brits, made a telegraph machine in 1837. pp. 426-7

Cooper, Anthony Ashley: See Shaftesbury.

Copernicus, Nicolas: Polish priest, astronomer, *Commentarius* 1514, *On the Revolutions of the Heavenly Spheres*, 1543, revived and refined the concept of heliocentrism, which had been ignored for 2000 years. 270 BC, 1513-4, '36, '43, '72, '76, '82, '89, 1609, '13, '16, '33, '44, '87-Newton, 1758, 1835, 1900, '62

Cortez, Hernan: Spanish, conquered Aztecs. 1519

Cosmas Indicopleustes: flat Earth. 538

Cosmic microwave radiation: cosmic rays, CMB, thermal radiation assumed to be left over from the *Big Bang*. 1992

Cosmological Arguments for God: including the *First Cause Arguments*, 335 BC-Aristotle, AD 230, 862, 1085, 1150, 1273, 1687-Newton, 1710, '14, '39, '79, '81, 1928-9,

Cosmology: a study of the origin and nature of the universe.

de Coulomb, Charles: experimented with electricity. 1785, '91, 1855. p. 424

Coulomb: the unit of electric *charge* defined as the *amount* of electric charge that flows past a given point in a wire in one second if the current is one amp.

Coughlin, Charles: a Catholic priest, a vicious anti-Semite, had a huge radio audience in the US extolling fascism. 1939

Council of Basel /Ferrara / Florence. 1431

Council of Constance: betrayed Hus. 1414

Council of Pisa: tried to resolve the Schism. 1409

Council of Trent: Roman Catholic Church reaction to the Protestant Revolt, no compromise. 1545-63

Counter-Reformation: actions taken by the Roman Catholic Church to stop the loss of subjects to the emerging Protestant sects. 1545, 1686, 1700

Coyne, Jerry: environmental biologist. Described evidences of evolution, 1751, 1950, '88, 2009, '14

Cranmer, Thomas: was named Archbishop of Canterbury by King Henry 8 to legitimize Henry 8's wedding to Anne Boylen. Later murdered by Henry 8's daughter, Bloody Mary (by Catherine 1). 1533

Creationism: popular false biblical belief that God created the universe and all species in their present form. Usually under 10,000 years ago. A 2017 Pew poll: 38% of Americans believe it. 1150, 1857, 1987

Crick, Francis: DNA. 1953

CRISPR: a revolutionary gene splicing technology, So scientists edit genes quickly and precisely. 2012

Critical race theory: is a kind of conflict theory, wherein social life is understood as a struggle for dominion about economic class, race, ethnicity, gender, religion, sexuality, gender identity.

Critique: n., not a criticism, a critical analysis

Critique of Judgment: Kant. 1790

Critique of Practical Reason: Kant. 1788

Critique of Pure Reason: Kant. 1781

Croce, Benedetto: Italy's most important 20th century philosopher, *Historical Materialism and the Economics of Karl Marx*. 1920

Cro-Magnon Man: early Modern man. 30,000 BC

Cromwell, Oliver: Brit PM: beheaded Charles 1: in 1649 massacred Irishmen, caused parliament

to rule. 1649, 1840, pp. 441, 453
 Crusades: 1096-1272, foolish series of papal wars killed Jews, Muslims, and Christian heretics. 1096, '99, 1146, '08, '10, 1215, 1555, 1689, 1863, 2000
 Crystal: Solid substance with a regular geometric arrangement of atoms. 1776
 Cult: 1. a purportedly religious group. Its beliefs regarding the supernatural are called by larger religions as bizarre. They *may* be more bizarre than the larger religions' bizarre beliefs, but not necessarily.
 2. Tom Wolfe: A religion with no political power.
 Cultural relativism: (Boas) All cultures must be understood on their own culture-specific terms thus all are equally valid. 1601
 Culture: 1. That which is transmitted to a group by means: communication, imitation, and forms interactions. 2. A state of organization between tribal / village and civilization. Numerous mentions herein.
 Curie, Pierre and Marie: physicists: discovered radioactivity in 1896. 1896
 Curie: Marie: (1867-1934) Polish, only woman to win two Nobel prizes. She is renowned for being refused admission to the French Academy of solely for being a woman.
 Curie: the unit of measurement of radioactivity.
 Curtis, Heber: said *nebulae* are separate galaxies beyond our *Milky Way*. 1917, '20, '24
 Cuvier, Georges: first paleontologist, evolutionist, *Memoir on the Species of Living and Fossil Elephants*. 1796
 Cynic: Greek school of philosophy. c.340 BC
 Cyrus: Persian king, Zoroastrian. c529 BC

D

Dalai Lama, chief Tibetan Buddhist monk. "My religion is kindness p. 416
 Dalton, John: Atoms are the building blocks of all matter. 1803, '06, '08, '11, 1905
 Damian, Peter: Cardinal, discovered every cleric in Milan practiced simony. 1059
 Dante Alighieri / Durante di Alighiero degli Alighieri: wrote *Divine Comedy*. 964, 1217, 1300, '08, '010, 1400, 1512, '14, '17, '24, 1808, 1943, '64, p. 418- the *Index*
 Darby, Abraham: Brit chemist, made and developed the blast furnace. 1709
 Darius 1: Persian: attacked Greece twice: 490 BC
 Dark Ages, The: After Rome's fall, an age of desolation in the West, government was feudal, not centralized, except for Christianity, the religion, which governed peoples' thinking. The body of knowledge shrank. c.450-c.1000
 Dark energy: non-visible, unknown type of energy inferred to exist with an anti-gravitational force to explain how the galaxies in the universe are

accelerating their expansion from the singularity. 1974, '82, '98, p. 436
 Dark matter: non-visible, unknown type of matter with gravitational effect inferred to exist to explain how rotating galaxies don't fly apart due to centrifugal force given their apparent calculated mass. It was first noted in 1933 by Franz Zwicky but not noticed. The most commonly accepted speculation as of 2022 is that dark matter consists of subatomic particles called WIMPs. 1933, '70s, pp. 1,436,
 Darrow, Clarence: greatest American lawyer, agnostic, "Some say religion makes people happy. So does laughing gas." 1920s-1940s. 11K BC, 1532, 1925
 Darwin, Erasmus: Charles Darwin's grandfather, noted evolutionist. "He who allows oppression shares the crime." 1794, 1809, '59, 1964
 Darwin, Charles: evolution, *The Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*, 1859, and *The Descent of Man and Selection in Relation to Sex*, 1871. 1779, '94, '98, 1831-2, '36, '38, '44, '55, '57-62, '71, '76, 1900, '07, '72
 Darwinism: evolution of species by natural selection. 1860, '62-4, '71, '77: 96, '99: 1932: '56, '96
 Daugerre: Louis: first practical photography, 1838
 Daughters of the American Revolution. A conservative American women's organization. In 1939, it refused to rent its 3700 capacity Constitution Hall to Marian Anderson, a famous opera singer because she was a Negro. Eleanor Roosevelt, a member of the DAR, resigned and arranged for Anderson to sing at the Lincoln Memorial. 75,000 people attended.
 Davy, Humphry: chemist, discovered that an electric current applied to chemicals could produce new chemicals, electrolysis. 1807, '71, p. 425
 Dawkins, Richard: biologist, atheist, *The God Delusion*, posited the concept of cultural evolution. "I am against religion as it teaches us to be satisfied with not understanding the world." "Evolution is blind to future." 1532, 1973, '76, '79, 2006, pp. 404, 415-6, 438-9 *Day-Age Theory*: a theological theory to justify *Genesis's* statement that creation took six days. It says that "day" really means "age" or "epoch."
 Deacon, Sir George: "If absolute power corrupts absolutely, where does that leave God? 1887
 Dead Sea Scrolls: discovered 1947-56 near the Dead Sea. 1947
 Debs, Eugene: Socialist, reformer, 1914, 1918
 Decameron, The: by Boccaccio. 1532
 Decimal system: 10-based math, Arabs brought it to the West c.1585. c.136 BC, c711, c.825, c.1408, 1585
 Declaration of Independence, U.S.: Jefferson was the principal author, influenced by writings

of Locke and Mason. Paine wrote much of the first draft. Certain basic human rights are self-evident and inalienable. Published July 4, 1776

Declaration of Independence of Viet-Nam: Ho Chi Minh, modeled on the *US Declaration*. 1948

Declaration of Indulgence: James 2 granted broad religious freedom in England and Scotland by penal laws enforcing conformity to the Church of England and allowing persons to worship as they wished. 1687

Declaration of Rights: US Stamp Act Congress. 1765

Declaration of Rights: First Continental Congress.

Declaration of Rights: Virginia, George Mason. 1776

Declaration of Rights of Women and the Citizen, Olympe de Gouges. 1792

Decline and fall of the Roman Empire. c.400-c.450

Decline and Fall of the Roman Empire: The: by Edward Gibbon. It defined the fields of comparative and sociology for 200 years. 1776

Deconstruction: philosophy, Jacques Derrida, 1967

Deduction: in logic, principle that true premises produce a true conclusion, Aristotle. c.335 BC, 300 BC, 1500, 1600, 1687-Newton, 1781

Defense of Raymond Seybond: Montaigne, 1580

Defensor Pacis: Marsiglio de Padua, a defense of democracy, 1324

Definite proportions, Law of: Chemical compounds always contain exactly the same proportion of elements by mass, sometimes called Proust's Law, originally posited by Jeremias Benjamin Richter in 1792, developed further by Joseph Proust in 1794, further evidenced by John Dalton in 1803 who showed that Atomic Theory explained it. 1805.

Defoe, Daniel: *Robinson Crusoe*, p. 418, the *Index*

De Gaulle, Charles: 1945

Deism / deist: 1620, 24, 1700, '30, '51, '54, 75, '76, '83, '89, '94-95, '1809, '74, 1973, 2000, p.362

De Magnete: William Gilbert: Earth is a magnet. 1600

Demagogue: a speaker who makes use of popular prejudices and false claims and promises in order to gain power. *Mein Kampf* specifically said that propaganda, political speech, must be directed exclusively to the less intelligent *volk*, not to the intelligensia. Demagogues usually have several common characteristics.

1. They give the masses a scapegoat to blame for their problems, usually a politically weak group, such as foreigners, a minority, Jews, Blacks, or Browns.
2. They offer hope for a better life.
3. They have a large and fragile ego.
4. They like the military.
5. They denigrate those who oppose them and democracy. And
6. They lie.

Democracy in America: Alexis de Tocqueville. 1835

Democracy: as a political philosophy, Originally, rule by the *demos*, the citizen body. In basic terms, it is where the central institutions of society are under popular control. It is such a powerful concept that all modern rulers claim to be acting with the will of the people. Democracies in different countries have different details, reflecting their histories. In modern times it usually includes the protection of certain rights (like the *US Bill of Rights*) to limit the "tyranny of the majority." Athenian "democracy" did not permit slaves, women, non-Athens-born persons to vote, own property, or inherit. (Similar to the *U S Constitution* before it was amended in 1920). Direct democracy is where everyone votes on particular issues (like town meetings New Hampshire) to *representative* democracy (voting for legislators). Democracy is the form of government most compatible with individual dignity, but like many concepts, the devil is in the details. The US is not a full democracy but a representative republic with democratic features. Democracy usually infers the winner for an office is whoever gets the most votes, but America has an indirect vote for president and vice president designed primarily by Alexander Hamilton, a monarchist, to prevent an "unsuitable" person who can attract the most popular votes from being made president. The *Constitution* of 1787 provided that state legislators appoint electors who then vote for the president and vice president in an "electoral college". This can overturn the popular and democratic one-man one-vote concept. This system has caused four persons who got fewer votes to be "elected" US president, including George W Bush, and Donald Trump. 125 countries have a popular vote for president. Not the US.

H L Mencken: "Democracy is only a dream." p.1, 594 BC, 508 BC, 490 BC, 435 BC, 431-BC, 425 BC, 399 BC, 387 BC, 340 BC, 910, 1324, 1651, '89, 1776, '87-88-*Federalist* #10. '90, 1835, '38, '63-64, '69-71, '99, 1933, '38-9, '41, '98, 2013

Democritus: atomist, materialist, student of Leucippus. 8000 BC, 504 BC, 450 BC, 430 BC, 387 BC, 335 BC- Aristotle, 300 BC, 1609, 1644, 1776, 1808, 1911

Demosthenes: Greek statesman 384-322 BC: 1514

Denison: George A: Archdeacon, anti-Darwin. 1864

Dennett, Daniel: philosopher, Natural Selection is mindless, mechanical, wasteful. 1976, p. 437

Deposition. Change of a gas becoming a solid without first becoming a liquid. The reverse is sublimation

Derrida, Jacques: philosopher, deconstruction. 1967

Descartes, Rene: considered to have founded modern philosophy. He sought to build a rational philosophy

- rather than one built on one's senses, i.e., experience. p.1, 425 BC, 387 BC, 413, 1076, 1267, 1583, 1600, '33, '37, '41, '44, '51, '54, '64, '70, '76, '87-90, 1748, '59, 1879, '93, '96
- Descent of Man and Selection in Relation to Sex:** 1871, by Charles Darwin. Written to explicitly say that humans descended from a primate, 1871
- Determinism:** the view that all events are determined by previous causes. 58 BC, 413, 1812, 1983, 2012,
- Deuterium:** an isotope of hydrogen, containing a single proton and neutron but no electron.
- Devil's Dictionary:** Ambrose Bierce, 1847-Social Critics
- Dewey, John:** American educator, philosopher, social reformer, psychologist, applied scientific knowledge to human affairs to reveal which values to enhance. 1916, '28, '50, p. 404
- Diagoras:** Athenian Sophist. 425 BC
- Dialectic:** a theory of the nature of logic, also the logic of reasoning which operates apart from experience, and purports, incorrectly, to give knowledge of the transcendent order of things in themselves. c504 BC, c.435 BC, 387BC, 335C-Aristotle, 1085, 1121-2, 1150, 273, 1820s, 1883
- Dialogue on the Two Chief Systems of the World:** (Geocentrism
Galileo's defense of heliocentrism. 1633
- Dialogues Concerning Natural Religion:** Hume, *inter alia* refuted the *Design Argument*. 1779
- Dialogues Concerning Nature:** Lucilio Vanini. 1619
- Dicke, Robert:** *Anthropic Principle* theorist, 1961
- Dickens, Charles:** *Great Expectations*, *Tale Two Cities*, *Hard Times* (a protest against educators who think only of money), *Christmas Carol*. Said, "The law is an ass, an idiot." 1847
- Dictator:** one who rules without the consent of the governed, like a king, warlord, or CEO. 65 BC
- Dictionary of the English Language,** Samuel Johnson: standardized English spellings. 1755
- Diderot, Denis:** philosophe, co-founded the *Encyclopedie ou dictionnaire raisonne des sciences, des artes et de metiers* 1751, and *d'Alembert's Dream*. 1670, 1700, '51, '61, 1830,
- Diet of Worms:** convened by HRE Charles 5, Martin Luther reputedly said, "*Hier stehe Ich. Here I stand. I cannot do otherwise.*" 1521
- Diffraction / Diffraction grating:** an optical component with a periodic structure that splits and diffracts light into several beams traveling in different directions. The emerging coloration is a form of structural coloration. The directions of these beams depend on the spacing of the grating and the wavelength of the light so that the grating acts as the dispersive element. Because of this, gratings are commonly used in monochromators and spectrometers. 1635, '72, 1814, 1900, '05
- Diffusion:** the random movement of molecules in a system.
- Dignity of Man, Oration on the:** humanism, Pico Della Mirandola. 1486,
- Dilemma:** a difficult choice between two alternatives. al Dinawari: *Book of Plants*. 880
- Diocletian:** Roman emperor before Constantine, severely punished Christians, burned many of their scriptures, retired to Split. AD 321
- Diodorus Siculus:** Greek historian. 1st century BC. 1532,
- Diogenes:** Greek, skeptic. "I am looking for an honest man." c.340 BC
- Dionysus:** Greek god of wine. 500 BC, 300 BC, 413
- Dioscorides:** *De Materia Medica* listed 500 medicinal plants, AD 83
- Dirac, Paul:** physicist, atheist, wrote definitive treatise on quantum mechanics in 1927. "The honest assertion that God is a mere product of Man's imagination is [considered]. . . the worst mortal sin. Religion is a jumble of false assertions, no basis in reality 1532, 1927, '30,
- Discourse on Floating Bodies:** Galileo contradicted Aristotle. 1612
- Discourse on the Origins of the Inequality of Mankind,** Rousseau. 1754
- Discourses and Mathematical Demonstrations Concerning the Two New Sciences:** Galileo, 1638
- Discourse on the Method of Rightly Conducting Reason and Seeking Truth in the Natural Philosophies,** Descartes, "*Je pense, donc, je suis.*" 1637
- Disney, Walt:** founded entertainment empire. 1941
- Disputation on the Power and Efficacy of Indulgences: The 95 Theses,** Martin Luther. 1517
- Disraeli, Benjamin:** English Prime Minister, opposed *Darwinism*. "Where knowledge ends, religion begins." 1837, '64, '80
- Dissertation Concerning Solids within Solids,** Nicolas Steno: explained fossils. 1671
- Divine Comedy / Divina Commedia:** Dante. 1310
- Divine Omnipotence, On:** Cardinal Damian. 1059
- DNA:** Deoxyribonucleic acid. Spiral helical polymer chains, a spiral double helix structure containing genes for all characteristics of an organism. 1953
- Dogma:** a religion's doctrine claiming authority over any private opinion, or, a religious "truth" stated by the ruling clergy. Rejecting it is heretical.
- Dogmatic theology** is that part of theology dealing theoretical truths of faith, especially the official of an organized Church. 1896
- Dominic:** founded Dominicans, monks active in conducting inquisitions, opposed slavery of

Amerindians. 1150, '98, 1200, '15, '17, '23, '47, '69, 1307, 1478, '84, '94, 1515-6, 19, '43, '76, 1614, '33, *Don Juan / Don Giovanni*: by Wolfgang Amadeus Mozart 1787, 1808

Don Quixote: by Miguel de Cervantes. 1605

Donahue, Phil: liberal TV journalist, for years asked people, "How do you *feel* about that?" This became the "go to" question for reporters and journalists who could not think of an intelligent question..

Donation of Constantine: *Donato Constantino*. c753. Proven a forgery only in 1440. 1440

Donatists: very early Christian sect, AD 325

Donne, John: Brit, cleric, *No man is an Island*, 1610
No man is an island, Entire of itself.
Each is a piece of the continent, A part of the main.
If a clod be washed away by the sea,
Europe is the less.
As well as if a promontory were
As well as if a manor of thine own
Or of thy friend's were.
Any man's death diminishes me,
For I am involved in mankind.
Therefore, send not to know
For whom the bell tolls, It tolls for thee.

Doppler, Christian / *Doppler Effect*: 1842, apparent rise in the frequency of a sound wave from an approaching body as its sound waves are bunched up. Opposite for receding bodies. 1842, '68

Dostoevski, Fyodor: *The Idiot*, *The Inquisitor*, *Brothers Karamazov*, 1880, pp. 401, 410, 420

Draco: Greek law giver, harsh / draconian. 620 BC

Douglass, Frederick: Black, escaped slave, orator, "The thing worse than rebellion is the thing that causes a rebellion." 1844

Douglas, William O: Supreme Court Justice, "if the First Amendment means anything . . . it must allow speech against the moral code of the community. 1857, 1954

Dowling, Edward: Jesuit priest, democracy. 1941

Drake, Francis: Sir, successful English pirate. 1577

Drama: 500 BC, 470 BC, 449 BC, 1975

Draper, Henry: photographed spectra of Vega, 1872

Draper, John William: *The History of the Conflict Between Science and Religion*. 1886

Dred Scott Decision: U S Supreme Court, Slaves are property. This showed the ugly political side of the Court. 1857

Dreiser, Theodore: 1941

Dreyfus, Captain Alfred: victim of French anti-Semitism. Vindicated by Zola's *J'accuse* in 1898. 1847

Drummond, Thomas: Property has duties as well as rights. 1835

Drummond, William: Sir, philosopher. 1628

Dualism: division into two opposed or contrasting aspects, like good and evil.

Dumas, Alexandre: *pere et fils*, French, writers. 1844, p. 418- the *Index*

Durant, Will and Ariel: historians, "The only real revolution is in the enlightenment of the mind and the improvement of character, the only real emancipation is individual, and the only real revolutionaries are philosophers and saints.. . The present is merely the past rolled up and concentrated in this second of time." "History has justified the Church in the belief that the masses of mankind desire a religion rich in mystery, miracle, and myth." 40K BC, 3500 BC, 1775 BC, 300 BC, AD 410, 1532, 1620, '55, 1751-free will, 1800, '87, 1904, '33, '38, '68, pp. 404, 418, 440

Duties, Cicero's last book. 44 BC

Duty to revolt: Locke, 1690, Buchanan, 1579, 1776-*Declaration of Independence* .

Dynamics: the study of masses and forces.

Dynamic Evolving Model: of the universe. Became known as the *Big Bang*. See Big Bang. p. 457

Dylan, Bob: songwriter, singer. Awarded the Nobel prize for literature.
"Oh my name it is nothin' My age it means less.
The country I come from is called the Midwest.
I's taught an brought up there the laws to abide.
And that the land that I live in has God on its side.
Oh the history books tell it. They tell it so well.
The cavalries charged. The Indians fell.
The cavalries charged. The Indians died.
Oh, the country was young with God on its side.
Oh, the Spanish-American War had its day.
And the Civil War too. Was soon laid away.
And the names of the heroes I's made
mem'rise, With guns in their hands and God on their side.
Oh, the First World War, boys, It
closed out its fate. The reason for fighting I
never got straight. But I learned to accept it. Accept
it with pride; For you don't count the
dead when God's on your side."

Dymaxion: Buckminster Fuller's word for his concept of the maximum performance per energy input.

E

E = mc^2 : equivalence of and relationship of matter and energy, Einstein. 1905

Eannes, Gil: Dom, Portuguese, captain in Prince Henry's navigation school, first to sail south past Cape Bojador on the NW coast of Africa. 1419

Earman, John: re the *Weak Anthropic Principle* (WAP) is a tautology. 1973

Ebionism: early Christian sect, 325

Economics: 1776, '98, 1800, '48, 1929, '36, 2013

- Eddington, Arthur: Sir, Brit, Never accept a fact til it is verified by a theory. 1911, '18-9, '30, '33
- Edict of Nantes*: French king Henry 4, edict letting Protestants vote, 1589, revoked by Louis 14. 1685
- Edinburgh Review*: most influential English language *Enlightenment* periodical. 1751
- Edison, Thomas: improved the light bulb.1883, p. 430
- Edmundson, Mark: *Self and Soul*. 2015
- Edwards, Jonathan: (1703-1758), charismatic Calvinist led the first Great Awakening. 1730s. "Hell is paved with the skulls of unbaptized children [Damned Infants are] young vipers and [to God] infinitely more hateful to God. Burning brimstone is extended abroad under you. There is the dreadful pit of the glowing flames of the wrath of God; there is Hell's wide gaping mouth open; and you have nothing to stand upon, nor any thing to take hold of; there is nothing between you and Hell but the air; tis only the power and mere pleasure of God that holds you up." 1525
- Efficiency: amount of work output relative to amount of work / energy used, in a machine or engine
- Egalitarian, belief that all humans are equal in fundamental worth or moral status.
- Egypt / Egyptian: Many mentions from 4000 BC to 600 BC on pp. 5-11. Then c.590 BC, 586 BC, 530 BC, 430 BC, 335 BC- Aristotle, 334 BC, 300 BC, 50 BC, 44 BC, 31 BC, 45, 230, 300, 400, c.642, c.910, 932, 1090, 1202, 1300, 1450, 1751, '99
- Ehrman, Bart: *God's Problem, How the Bible Fails to Answer Our Most Important Question-Why We Suffer. Misquoting Jesus. Jesus, Interrupted: revealing the Hidden Contradictions in the Bible and Why We Don't Know About them*. 1775 BC, AD 100, AD 190, 1985, 2008, pp.405, 411, 441
- Einstein, Albert: *Special Theory of Relativity* 1905, *On the Electrodynamics of Moving Bodies* 1905, *Cosmological Considerations on the General Theory of Relativity* 1915, $E = mc^2$, (Amazing to hear him say that he hardly ever thinks in words.) Space-time. p.1, 335 BC-Aristotle, 1583, 1613, '64, 1714, '83, '96, 1826, '60, '86, 1900, '05, '07, 12-5, '18-9, '22, '24, '27, '30, '33, '19, 2006, '09, '12-3
- Eisenhower, Dwight: US general, commander of allied forces in WW2, president. 65 BC: 1532
- Eisenman: Robert: historian. AD 96
- Elasticity: the propensity and ability of a body to regain its original shape after it is deformed.
- Elci: Italian Monsignor, anti-Galileo 1614
- Eldredge: Niles: paleontologist, and Stephen Jay Gould popularized "punctuated equilibrium." 1972
- Electric current: a flow of electrons along a conductor. 1808, '20, '25, '27, '31, '60, '73, 1900, '05, '15
- Electric motor: 1821, '23, '31(Faraday)
- Electricity: a form of energy resulting from the existence of charged particles-protons or electrons either statically as an accumulation of charge or dynamically as a current.
- Electrodynamics: the study of the relations between electrical, magnetic, and mechanical phenomena, including the study of magnetic fields made by electric currents, the electromotive forces induced by changing magnetic fields, the forces on currents in magnetic fields. 1825, '60, 1927,'52
- Electrodynamics of Moving Bodies*: Einstein. 1905
- Electrolyte: a liquid ion solution that conducts electricity.
- Electrolysis: chemical reaction due to a current passing thru matter, can extract metal from ore. 1800, 1831
- Electromagnetic field. 1820-1, '23, '25, '31, '55, '64, '66, '73, '97, 1915, '24
- Electromagnetic force: the second strongest of the four fundamental forces of nature. The other three are the strong interaction, the weak interaction, and the weakest, gravitation. This force is described by electromagnetic fields, and has innumerable physical instances including the interaction of electrically charged particles and the interaction of uncharged magnetic force fields with electrical conductors 1820, '73, '88,'96, 1900, '05, '07, '33, '50, '68
- Electromagnetic radiation: energy emitted by all objects warmer than Zero Kelvin. 1865: 1900: '05
- Electromagnetic spectrum: is the range of wave frequencies of electromagnetic radiation. The radiation is composed of vibrating electric and magnetic fields, and it travels through empty space and through transparent substances (glass, water) at c. 300,000 kilometers per second.1800, '42,'65-6, 1924
- Electromagnetic wave(s): All matter radiates electromagnetic waves with frequencies that define them. Waves have both an electric and magnetic component. The range of wave lengths is huge, from less than 100 million-millionths of a meter for cosmic waves to thousands of meters for radio waves. Electromagnetic frequencies vary from 10,000 per second for radio waves to a million million million vibrations per second for cosmic rays. The types of electromagnetic radiation are broadly classified into the following classes (regions, bands or types): From highest frequency to lowest.
- Gamma radiation
 - X-ray radiation
 - Ultraviolet radiation
 - Visible light (light that humans can see)

Infrared radiation
Microwave radiation
Radio waves.

Waves vary from microscopic to miles.
Gamma rays are the most energetic and shortest wave length waves). Radio waves are the least energetic (longest wave length). 1842, '48, '64, '66, '88, '95, '98, 1905

Electromagnetism: branch of physics linking electrostatics, electric currents, magnetism, and optics into one conceptual framework.

Electromagnetism Timeline: pp. 422-432

Electron: a negatively charged sub-atomic particle.

Electrons are in the lepton particle family and are considered elementary particles as they have no known sub-components. Discovered by Chadwick in 1932. An electron weighs 1 / 1840 of a proton. See Atom this Index for a fuller discussion of the structure of an atom. 1932

Element: the smallest component of matter that can be resolved by analysis. Elements (gold, silver, iron etc) are made up of one type of atom. Atoms of different elements differ in size, weight, and their constituent particles. The atoms of one element can combine with the atoms of one or more other elements forming molecules. Elements are not the ultimate elementary constituents of matter as atoms are made up of sub-atomic particles. See Atom, this Index

Elementary particle: Sub-atomic particle with no known sub-components, See Atom

Elisabeth, Princess of Bohemia. Asked Descartes to explain precisely how the supposed immaterial mind causes bodily motion. He had no answer. (no one has discovered the answer. The work of physicist, Peter Putnam, is promising. His answer is basically that the supposed immaterial mind is actually material.) 1964

Ellsworth, Lincoln, Arctic explorer, north pole, 1926

Emerson, Ralph Waldo: 1835, US's most popular and influential orator. "All history is but the lengthened shadow of great men. And, as men's prayers are a disease of the will, so are their creeds a disease of the intellect." 1580, 1775, 1836, p. 403

Empedocles: there are four elements, earth, air, fire, and water," and "It is impossible for anything to come from what is not, and it cannot be brought about or heard of that what is should be utterly destroyed." (400 BC)

Empiricism: view that all knowledge comes from our sense organs, from experience, experiment and observation, and does not involve any innate knowledge; 450 BC, 387 BC, 1217, '68, 1600, '33, '37, '61, '88, 1700, '39, '48, '62, '81, 1846, 1922

Encyclopedie ou dictionnaire raisonne des sciences, des artes, et de metiers: many volumes, guiding document of information for the *French Enlightenment*, founded by Denis Diderot and Rond d'Alembert. 1751

Energy: the capacity of a physical system to do mechanical work. 1150, 1687-Newton, 1710, '14, '51, '35, '47, 1800, '21, '31, '24, '52, '75, '77, 1900, '05, '13, '39 (see also Conservation of Energy, law of)

Energy, biological: energy generated in cells. 1881

Energy, chemical: a type of potential energy that is produced by a chemical reaction, like a match burning transforms chemical energy into heat.

Energy, electromagnetic, from electromagnetic waves.

Energy, gravitational: negative energy, a mass high up has gravitational potential energy (like an avalanche, 2009, see also gravity

Energy, Internal: The sum total of the kinetic and potential energies of a mass's atoms, 1747, 1824

Energy, kinetic: energy in a body in motion, $KE = .5M \times \text{velocity squared}$. 1687-Newton, 1735, '38

Energy, mechanical: 1687, 1842, 1987, '98, 2009

Energy, nuclear: heat from a nuclear reactor. It can be converted into electric energy. 1701

Energy, positive: matter, as opposed to negative energy, i.e., gravity. 2009

Energy, potential: capacity for a body to do work due to its position or condition, a charge in an electric field, 335 BC-Aristotle, 1687-Newton.

Energy, pure energy: (minimal mass), photons, sunlight, proportional to temperature, light/ photons (composed of hadrons), the visible area of the electromagnetic spectrum, can be converted into heat or electricity. 1900, '24, '26, '39, '64

Energy, radiant: the continual emission of energy from the surface of all bodies, in the form of electro-magnetic waves. When the waves hit a body not transparent to them, they are transformed into heat.

Energy, radioactive: radiation. 1896, 1900

Energy, sonic, 1701

Energy, thermal: thermodynamics. 1843, 1847

Energy, wave theory: 1690. 1736, 1803, '46, 1900, '05

Energy-mass equivalence: Einstein. 1905

Engels, Friederich: 1945. *Communist Manifesto: The Condition of the Working Class in England*. '71

English constitution: (not a written document). 1748

Enki: Sumer god of creative forces. c5000 BC

The Enlightenment: Age of Reason (more or less), an intellectual movement, mainly in England, Scotland, and France peopled by the emerging capitalist class who questioned the crown; characterized by disdain for traditional institutions such as religions and the monarchy, stressing the

- appeal to reason in matters of belief and conduct. c.1650-c.1780.
- Enquiry Concerning Human Understanding:** David Hume. 1748
- Entropy:** lost /dissipated unusable energy when one form of energy is transformed into another;
Second Law of Thermodynamics, the state of disorder in a thermo-dynamic system, the more energy, the higher entropy. 1824, 1906-matter d'Envieu, Fabre: anti-Darwin. 1859
- Epic poems:** Sumerian *Gilgamesh*, *Epic of Creation*, and *Poem of the Righteous Sufferer* c2000 BC. Greece, *Iliad*, *Odyssey*, Homer, 9th Century BC. Hindu *Mahabharata*, 600 BC. German *Parzival* 13th century, and *Niblengun*, 1200. Persian/ Muslim-*Masvani*, 1250. Spain *Cantar del Cid*, 1140, English *Beowulf* 1200, France *Chanson de Roland*,
- Epictetus:** Roman: Conform nature to reason:
Only the educated are free. c.1300 BC: AD 120
- Epicurean Paradox:** see *Problem of Suffering*.
- Epicurus:** philosopher/ Epicurean school, the view that avoidance of pain through an intellectual life is the basis for an ethical life. 300 BC
- Epistemology:** study of the nature, history, methods and principles of knowledge. p.1, 425 BC, 1929, '63, '93, 2010
- Equilibrium of Heterogeneous Substances, On the:** (The *Principia* of thermodynamics), Willard Gibbs. 1875
- Equivalence Principle:** a space ship's instruments can't distinguish between acceleration and gravity. 1907
- Erasmus, Desiderius:** wrote *Praise of Folly*. 1509, '16-7, '25, '45, '76, 1600, '05
- Eratosthenes:** director of Alexandria Library. 240 BC
- Erickson, Lief:** wintered in Newfoundland, c.1000
- Eschatology:** a pseudo-science concerning "the four last things" death, judgment, Heaven, Hell.
- Essais de theodiciee:** Leibniz, posited several arguments to justify evil and suffering to refute the *Problem of Suffering*. 1710
- Essay Concerning Human Understanding:** Locke. 1690
- Essay Concerning Toleration:** Locke. 1689
- Essay on Miracles:** David Hume. 1748
- Essays and Reviews:** Seven Anglican clerics pointed out rational and scientific errors in *the Bible*. 1860
- Essence,** the fundamental qualities that make something what it is.
- Esthetics:** the study of the nature of beauty; in Kant: the study of sensation.
- Ethical dualism:** 620 BC
- Ethics:** a branch of philosophy, study of the principles governing right and wrong knowing that different cultures have different concepts of right behavior.
- Normative ethics** refers to the specific content of moral codes.
- Metaethics** the criteria and meaning of ethical terms themselves, like value and moral.
- Ruth Benedict:** Morality is just a term for socially approved customs.
- William Shakespeare:** There is nothing either good or bad but thinking makes it so.
- Robert Ingersoll:** Right and wrong exist in the nature of things. Things are not right because they are commanded, nor wrong because they are prohibited.
- Oscar Wilde:** Modern morality is accepting the standards of one's age.
- Alfred North Whitehead:** Morality in any given time or place is what the majority then and there happen to like, and immorality is what they dislike. 430 BC, 425 BC, 335 BC-Aristotle, 44BC, 1450, 1589, 1670, 1726, '51, '89, '1861-2, 1977
- John Rawls:** Justice is fairness. 1971
- Euclid:** *Principles of Geometry*, based on self-evident axioms. 300 BC, 524, 711, 1085, 1499, 1687-Newton, 1776, 1796, 1915
- Eudoxus:** Greek astronomer, taught geo-centrism, Sun and planets orbit the Earth, 335 BC.
- Eugene 4,** pope, in 1437-45 issued *bulls* urging inquisitors to be more diligent punishing magicians and witches.
- Eugenics:** the science of using controlled breeding (including artificial insemination) to increase the occurrence of desirable heritable characteristics among humans and animals. Among humans, It can encourage mating between persons with desirable characteristics and discourage mating by persons with undesirable characteristics. It was described by Plato and advocated by Sir Francis Galton, a cousin of Charles Darwin.
- A eugenics movement emerged in the early 20th century in Europe and America. It is taught in Animal Husbandry classes. Eugenics is used extensively in livestock industries to increase animals' values, including selling bull semen. Nazi doctors went to unethical and illegal limits and made it a pariah science. 1859, '99
- Euler, Leonhard:** mathematician, *Nova theoria lucis*. Light is better understood as a wave 1736
- Euripides:** third great Greek tragedian. *The Frogs*-405 BC, *Lysistrata*- 411 BC, *Birds*- 414 BC, *Clouds*, 423 BC, *Wasps*- 42 BC, *Knights*, 424 BC, 470 BC, 425 BC
- Euthyphro dilemma:** Is an act moral as God says so or is it moral in itself? Socrates. 399 BC

Evaporation: the change of a substance from to vapor below its boiling point.

Evil: (noun) In philosophy and religion, a state of affairs that causes unnecessary and pointless suffering to innocents.

Evolution by natural selection: Darwinism, in biology, the doctrine that all life on earth evolved from simple organisms over eons due to the struggle for survival. **Clarence Day:** “An amoeba on the beach, blind and helpless, a mere bit of pulp—has grandsons today who read Kant and play symphonies.” 7M BC, 30K BC, 590 BC, 58 BC, c.820, 1150, 1625, 1749, 1802, ‘09, ‘55, ‘57-9, ‘87, ‘99, 1907, ‘16, ‘25, ‘31-2, ‘50, ‘56, ‘72-3, ‘75, ‘93, ‘96

Evolutionary biology: the biological subfield that studies the evolutionary processes such as natural selection, common descent, and speciation that produced the diversity of life on Earth (including Man.) It modified “survival of the fittest;” and used ethology, ecology, and genetics to derive general principles concerning the biological properties of entire societies. What we are, how we act is the result of evolution. 1975

Existential: That which deals with our existence.

Existentialism: 1. Refers to the existence of a concept or group of persons. 2. A philosophy that emphasizes the contrast between human existence and the kind of existence possessed by natural objects Started by Kierkegaard c.1846 in reaction to the idealism of Hegel. 3. Christian existentialism, a style of theology inspired by Kierkegaard that tests every doctrine by its derivation from human experience and its power to illuminate human experience. Pius 12 condemned it. 1827, ‘46, 1943

Experimental Science, On: / Scientia

Experimentalis: Roger Bacon. 1267

Extraordinary Popular Delusions and The Madness of Crowds 1841. Charles McKay. 1212

Eysenck, Hans J: psychologist: cheat, 2012

F

Fabricus, Hieronymus: Italian, veins have one-way valves. Arteries don’t have or need them. 1603

Faggin, Fredrico, MOS Technology. p. 433

Fahrenheit, Daniel: Dutch, invented a thermometer. 1717

Faith: 1. a religion

2. a belief in an assertion without evidence.

Frederick L Schuman: “Belief in the preposterous is ever the true test of faith.

3. **Mark Twain:** Faith is believing what you know ain’t so.

4. **Ambrose Bierce.** Belief without evidence in what

is told by one who speaks without knowledge, of things without parallel.

Fallacy: a false statement. Logical fallacy, a faulty argument. 335 BC-Aristotle, 1620, 1779, 1860, 1929, 964, 1973. 65 different types on p. 443.

Fallon, Richard, legal scholar, 1981

Falwell, Jerry: prominent TV Christian, 2001

al Farabi, Abu Nasr: Persian, second in knowledge to Aristotle. c.910, 1776

Faraday, Michael: Brit, concept of fields, magnetic field, electric current can cause motion. 1735, 1800, ‘21, ‘35, ‘38, ‘66, ‘73

Al-Farghani's Kitab fi Jawani / A compendium of the science of stars. 850

Farming: increased food production greatly. p. 1, 15K BC, 9K BC, 8K BC, 6K BC, 5K BC, 3500 BC, 3000 BC, 1500 BC, 1100 BC, 250 BC, 31 BC, 1500, 1776, ‘98

Farnese, Pier: son of Pope Paul 3. 1542, 1862

Farrar, F.W. philosopher, (re Augustine). 413

Fascism, a form of radical authoritarian

ultra-nationalism, characterized by dictatorial power, racism, forcible suppression of opposition and strong regimentation of society and of the economy. Fascism emerged in Italy after World War 1, then spread to Germany and Hitler. It identifies itself as Christian and is opposed to liberalism, Marxism, democracy, and anarchism. It gives the masses scapegoats like foreigners, Blacks, or Jews. Fascists say that liberal democracy is obsolete and regard the complete mobilization of society under a totalitarian one-party state as necessary to prepare a nation for war and to respond effectively to economic problems. Fascism was popular with some very influential Americans during Mussolini and Hitler’s time but went underground when Hitler stupidly declared war against America. 1919, ‘22. ‘33-34, ‘36-40, ‘45, p. 443

Fatalism: the doctrine that nothing which the individual can do can in any way affect the fate to which he is destined.

Fatimah: oldest daughter of Mohammed. 634

Faust: Johann von Goethe. 1808, ‘32

Ferdinand: King and Queen Isabella: gave Columbus 3 ships; began their Spanish Inquisition. 1478, 1492

Ferguson, Adam: *Essay on the History of Civil Society* Civil society is synonymous with modernity, 1768

de Fermat, Pierre: theory of probability. 1645

Fermat's principle of least time. 1020

a Fermat prime: (number). 1796

Ferranti, Sebastian: first electric generating plant. 1891

Festinger, Leon: showed how tenaciously one holds one's beliefs when facts contradict them. 1957

Feudal / feudalism: where a “lord” “protects” and allows

- peasants / serfs to farm or do other activities on land he controls for money, crops, or service. 530 BC, 250BC, 550, 753, 1000, '96, 1292, 1453, '55, 1904
- Feuerbach, Ludwig: Divinely inspired "morality" justifies cruelty. God is a man-made invention. 1841
- Feyerabend, Paul: *Against Method, Science in a Free Society*. 1975
- Feynman, Richard: eminent nuclear atomic physicist. In 1952, with others, combined electromagnetic theory with quantum theory to discover quantum electrodynamics. 450 BC, 335 BC-Aristotle, 1861, '97, 1927, '49, '52, '58
- Fibonacci, Leonardo / Leonardo of Pisa: *Book of Computations*. 1202
- Fichte, Johann Gottlieb: the first major prophet of German nationalism, 1796, 1807
- Fideism / Fideist: God's existence may not be demonstrable but rests on faith alone. If God's existence were rationally demonstrable, faith in God's existence would not be needed.
- Fields of force: a region in space that is defined by a Vector function. There are gravitational, electric, and magnetic fields with lines of force. 1820-3, '25, '31, '60, '64, '66, '73, '97, 1905, '07, '15, '24, '33, 35, 75
- Fields of force, gravitational: 1905, '07, '15
- Field of force, magnetic: illustrated by a compass
- Field Theory*: Clerk-Maxwell and Faraday, Field theory usually refers to a construction of the dynamics of a field, i.e. a specification of how a field changes time or with respect to other independent physical variables on which the field depends. Usually this is done by writing a Lagrangian or a Hamiltonian of the field, and treating it as a classical or quantum mechanical system with an infinite number of degrees of freedom. The resulting field theories are referred to as classical or quantum field theories. (Wikipedia) c.1865
- Filipovic, Jill: Legal writer, 1980s
- Finalism: the doctrine that events are caused by the purposes they serve.
- Finici, Marcillo: translated Plato into Latin. 1450
- First Vatican Council*: "voted" Pius 9 infallible in a vote he rigged. 1870
- Fission: in physics, when a nucleus of an atom (usually uranium) splits creating different elements whose protons equal the number of protons of the original element. (Don't confuse with Fusion, i.e., when nuclei of two atoms combine). 1939, '53
- The Five Pillars of Islam*: c640
- Five Wounds of the Church*: Antonio Rosmini. 1848
- Fizeau: Hippolyte-Louis: measured speed of light said light waves have a "Doppler" effect. 1868
- Flaubert, Gustav: *Madame Bovary*. "Nothing great is ever done with fanaticism. Fanaticism is religion: and the 18th century philosophes who decried the former actually overthrew the latter. Fanaticism: is faith, the essence of faith, burning faith, the faith that works miracles . . . Religion is a relative conception, a thing invented by man - an idea, in sum; the other is feeling. . . ." 1847
- Fleming, Alexander: Scot, in 1928 he discovered penicillin. He published his work. No notice was taken. 1941
- Fleming, John Ambrose: Sir, English electrical engineer, invented the first thermionic valve or vacuum tube, designed the radio transmitter with which the first transatlantic radio transmission was made. 1904.
- Flemming, Walther: discovered the process whereby cells divide into two identical cells, mitosis. 1882
- Floating Bodies, Discourse on*: Galileo. 1612
- Florence, Italy: c.1300, '10, '97, 1430-1, c'50, '53-4, 1516, '32, 1614, '24, '33, '57
- Flower, Ralph: *Zeroth 4th law of Thermodynamics*: Two bodies with the same temperature as a third body have the same temperature. . . 1935
- Fools: see also Stupidity, this Index. p. 477.
- Mark Twain, Hain't we got all the fools on our side, ain't that a big enough majority in any town?
- James Rozoff, "Fools are in the majority, and they never lack confidence because a fool believes that being in the majority is proof that one is right."
- Guy de Maupassant, "As the mediocrities and the fools always form the immense majority, it is impossible for them to elect an intelligent government."
- Machiavelli: "[T]he world is composed of such as are called the vulgar."
- John Locke, "A great part of mankind are . . . unavoidably given over to invincible ignorance."
- Denis Diderot, "Fools have been and always will be the majority of mankind."
- Bertrand Russell, "in view of the silliness of the majority of mankind, a widespread belief is more likely to be foolish than sensible."
- H L Mencken, "The great masses of men are ignorant, dishonest, cowardly, ignoble. They know little of anything that is worth knowing."
- Cardinal Richelieu, The common people "are less well informed than members of the other orders. One should compare them with mules."
- Erasmus, Fools are without number.
- Henrik Ibsen, We "must agree that stupid people are in a terrible majority all the wide world over."
- Niccolo Machiavelli, "As men are stupid, deceit is easy, and the clever man will always win."
- Francis Bacon, There is in human nature generally more of the fool than of the wise
- Alexander Hamilton, "Take mankind in general,

- they are vicious,. . . All communities divide themselves into the few and . . . the mass of people . . . The people. .seldom judge or determine right.”
- Thorton Wilder, 99% of the people in the world are fools and the rest are in great danger of contagion.
- George Villiers, Duke of Buckingham. The world is made up for the most part, of fools or knaves. Fools being slaves to Bigotry
- Samuel Butler, There are more fools than knaves in the world.
- Voltaire, the number of the wise is nothing compared to the number of fools. #
- Force, in physics: any influence that causes an object to move or change its velocity. It can be a push or a pull force. It can be a direct contact force or an action-at-a-distance force. When a force moves it expends energy and produces work. We know what forces do (we measure them) but not what forces are. Types of forces: external, centrifugal, centripital, conservative, electrical, friction, impulsive, internal, gravity, magnetic, momentum, restoring, and nonconservative.
- Forces, fundamental: Gravity, the very weak nuclear force, electromagnetism, and the strong nuclear force. These forces govern everything that happens in the universe. In 1968 Steven Weinberg determined that gravity and the weak nuclear force were identical so there were then three fundamental forces.
- Force, Fraud, Favors*: stages of control of a conquered people, Frederick Schuman.1532
- Ford, Henry: proved theory to pay only "subsistence" wages is not practical or necessary. Extreme anti-Semite, "Change is not always progress." pioneered mass production. 1817, 1936
- Foscarini, Pablo: monk, tried to reconcile heliocentrism with *the Bible*. 1616
- Foucault, Jean-Bernard-Leon, and Fizeau: measured the speed of light. 1862
- Foucault, Michael: *Madness and Civilization, A History of Insanity in the Age of Reason*, 1961
- de Foulques, Charles Cardinal/Pope Clement 4: 1267
- Fourier, Jean-Baptiste Joseph: *On Propagation of Heat in Solid Bodies*, one of the most important discoveries in the history of thermodynamics, the heat equation, how heat / thermal energy goes from a hotter body to a cooler body. 1807
- Fox, George: (1624-91) founder of Society of Friends (Quakers).1765
- France, Anatole: "Nature, in her indifference, makes no distinction between good and evil. *Free will* is but an illusion." 1751, 1847, p. 418
- Francis of Assisi / founded Franciscans: 1150, 1200, '09 '17, '47, '67-8, '90, 1331,
- Francis: Pope, first Jesuit pope, 2013
- Frank, Anne: Dutch girl murdered by Nazis because she was Jewish. "The best remedy for those who are frightened, lonely, or unhappy is to go outside, somewhere they can be alone, alone with the sky, nature and God. For then and only then can you feel that everything is as it should be and that wants people to be happy amid nature's beauty and simplicity."
- Frankfurter, Felix: US Supreme Court Justice, Difficult cases involve more than one principle. Anybody can decide a question with only a single principle. 1954, p. 468
- Franklin, Benjamin: scientist, all-around genius, member of the Royal Society for his work on electricity, statesman, publisher of *Poor Richard's Almanack*, only person to sign the *Declaration of Independence*, the *Treaty of Alliance with France*, the *Paris Peace Treaty*, and the *U S Constitution*. His *Experiments and Observations on Electricity* was widely read in US and Europe. 1624, '90, 1715, '76, '89, 1911
- Franklin, Rosalind: non-acknowledged scientist crucial to the discovery of DNA. 1953
- von Fraunhofer, Joseph: invented the spectroscope, saw that the spectrum of a gaseous body is non-continuous. 1814
- Frederick 1: HR emperor, academic freedom. 1158
- Frederick 2: king of Denmark, gave the island of Hven to Tycho Brahe
- Frederick 2 / Frederick the Great: Prussia, patron of intellectuals. c.1733, '36, p. 416- the *Index*
- Free radical. A molecule with an uneven number of protons and electrons.
- Free speech and thought: opinions:
- Euripides: Not to speak one's thought is slavery.
- Diogenes: The most beautiful thing in the world is freedom of speech.
- Francis Bacon: Liberty of speech invites and provokes liberty to be used again, and so increases man's knowledge.
- James Madison: There are more instances of abridgement of free speech by gradual encroachments than by violence.
- Thomas Jefferson: 1786. "Reason and free inquiry are the only effectual agents against error. . .The opinions of men are not the subject of civil government nor under its jurisdiction. I am really mortified to be told that in the United States of America, a fact like this can become a subject of inquiry, and of criminal inquiry too, as an offence against religion; that a question about the sale of a book can be carried before the civil magistrate. Is this then our freedom of religion? And are we to

have a censor whose imprimatur shall say what books may be sold, and what we may buy?, Our liberty depends on the freedom of the press, and that cannot be limited without being lost.”

And in 1788, [The Earth] is inhabited by a thousand millions of people. That these profess probably a thousand different systems of religion. That ours is but one of that thousand. That if there be but one right, and ours that one, we should wish to see the 999 wandering sects gathered into the fold of truth. But against such a majority we cannot effect this by force. Reason and persuasion are the only practicable instruments. To make way for these, free enquiry must be indulged.

Benjamin Franklin: Whoever would overthrow the liberty of a nation must begin by subduing the freeness of speech.

George Washington: If freedom of speech is taken away, then dumb and silent we may be led, like sheep, to the slaughter.

John Adams: Government has no right to harm a hair on the head of an atheist for his opinions. 1816

Robert G Ingersoll: “As long as organized powerful religions pretending to hold the keys to Heaven and Hell, and denounce every person as an outcast and criminal who thinks for himself and denies their authority, the world will be filled with hatred and suffering.”

Emma Goldman: The free expression of the hopes and aspirations of a people is the greatest and only safety in a sane society.

Felix Frankfurter, Supreme Court Justice. Freedom of expression is the wellspring of our civilization.

Elmer Davis, Don’t let [the censors] scare you. They are afraid that what they think will not stand critical examination.

Philip Pullman: Brit. No one has the right to live his life without being shocked or offended.

A J Liebling (1904-1963): Freedom of the press is guaranteed only to one who owns one.

Theodore Roosevelt: To say that there must be no overt criticism of the president. . . is not only unpatriotic and servile, but is morally treasonable to the American public.

Louis Brandeis: If there be a time to expose. . falsehood. . . , the remedy is more speech, not enforced silence.

H L Mencken: I believe in complete freedom of thought and speech. . . It is better to know than be ignorant.

Eleanor Roosevelt, It is very difficult to have a free, fair, and honest press anywhere. In the

place, as a rule, papers are largely supported by advertising, and that immediately gives the advertisers certain hold over the medium which they use.

Clarence Darrow: 1920 *The Constitution* is a delusion and a snare if the weakest and humblest man in the land cannot be defended in his right to speak and his right to think as much as the strongest in the land.

Thomas Emerson: American civil rights lawyer, Suppression of belief, expression is an affront to the dignity of Man.

George Seldes: It is possible to fool all the people all the time when government and press cooperate.

William Renquist, Chief Justice, Unpopular speech is healthy to a nation.

George Orwell: If liberty means anything, it means the right to tell people what they do not want to hear.

UN Universal Declaration of Human Rights

1948: Everyone has the right to freedom opinion and expression; This right includes freedom to hold opinions without interference and to seek, seek, receive and impart and ideas through any media and regardless of frontiers.

Noam Chomsky: The smart way to keep people passive and obedient is to strictly limit the spectrum of acceptable debate, but allow lively debate within that spectrum. Freedom of speech [in America] is protected more than any other country.

William O Douglas: Restriction of free thought and free speech is the most dangerous of subversions.

Carl Sagan: We must try to free our minds of dogmas and to guarantee the freedom to publish. . . and to experiment. . . If you are. . . skeptical about everything, you are going to miss or resent it. . . and will stand in the way of understanding and progress.

G

Gabriel: archangel, guided Mohammed to Allah

Gaeric: a Vandal, sacked Rome, bought off. 410

Gaia hypothesis, Earth is a living organism with a self-regulating mechanism that is yet undefined.

Galaxies, multi-million or multi billion groups of stars, planets, black holes, and possibly dark matter and dark energy held together by gravity.

Our solar system is in the galaxy *Milky Way*.

Until Hubble, 1924, astronomers thought the *Milky Way* was the total universe. He proved that there were other galaxies beyond the *Milky Way*.

Dwarf galaxies can have as few as 10M stars; giant

galaxies can have 100 trillion. 964, 1755, '85, 1886, 1912, '15, '17, '20, '24, '27, '29-30, 33, 48, 52, 61, 64, 68, 70s, 73, 92, 2004, p. 434

Galbraith, John Kenneth: Canadian-American. Economist, philosopher. 1870s, 1977

Galen, Cladius: Greek physician, c AD 160, 1543

Galilei, Galileo: *On Motion* 1590, *Starry Messenger*, *Sunspots Letters* 1612, *Discourse on Floating Bodies* 1632, *Dialogue on the Two Chief Systems of the World, the Ptolemic and the Copernican*. He founded modern science, greatest scientist of his time, The Church persecuted him, basically for embarrassing the Church. 600 BC, 335 BC-Aristotle, 1267, 1543, '83, 89-90, 1600, '05, '09, '12-18, '24, '32-33, '38, '44, '56, '64, '70, '75, '86-8, 1758, 1864, 1962, '96

Galton, Francis: Brit, founder of eugenics and behavioral genetics, proposed to produce a race of gifted persons through selective breeding. 1869

Galvani, Luigi: physicist. 1791

da Gama, Vasco: Portuguese, first known to sail to India around the Cape of Good Hope. 1497-99

Gamma rays: most energetic form of electromagnetic radiation. 1866

Gamow, George: *The Origin of Chemical Elements*, evidence for *Big Bang*. 1948, 1964

Gandhi, Mohandas Mahatma: with Nehru, gained India's independence in 1947. 1775 BC, 1532, 1896, 1907, '24, '31, '46-7

Gas: a substance with perfect molecular mobility and the property of indefinite expansion. A noble gas does not react with other substances. Ideal gas, a hypothetical gas that follows Boyle's laws of gas at all temperatures and pressures. Laws and properties of, 1624, '38, 1755, '75, '83, '87, 1802, '59, '73, '77, '97

Gassendi, Pierre: *The Life and Morals of Epicurus*. 1647

De Gaulle, Charles: (1890-1970) French general, statesman, premier, 1945

Gauss, Carl: non-Euclidean geometry. 1796, 1915

Gautama, Siddhartha: known as the Buddha (means the Chosen One), founded Buddhism c528 BC.

Gay-Lussac, Joseph Louis: He is known for *the law of combining volumes* (just below), and the law that measured the temperature factor of Jacques Charles and Guillaume Amontons's temperature addition to *Boyle's law of gasses*. It is sometimes referred to as *Gay-Lussac's law*. But the first known scientist to recognize a correlation between heat and pressure of a gas was Amontons c.1700, so the law is now more properly known as the *Amontons-Gay-Lussac law*. 1802, '08, '11

Gay-Lussac law of combining volumes: As all gas atoms or molecules are the same size, when ideal gasses combine with one another, they do so in volumes that are in small number ratios. 1808

Geiger, Abraham: German Reform rabbi. 1820s

Geissler, Johann: neon lights. 1860

Gell-Mann, Murray: particle physicist. 2015

Gene / genetic: the unit of heredity; genes are parts of chromosomes. p.1, 30K BC, 9K BC, 387 BC, 1859, '99, 1907, '32, '53, '73, '75, '96

General Natural History and Theory of the Heavens. Kant's 1755 speculation that there were galaxies beyond the Milky Way. 1755

Generation of Vipers: Philip Wylie. 1943,

Genetic mutations: changes in the DNA, are random, can cause new species or lesser changes in an offspring. de Vries. 1899

GenGenetics: word coined in 1905 by William Bateman for the science of heredity.

Genghis Khan / Universal Ruler: Mongol Conqueror. Created the largest empire in history. 1198, 1206

Genome: the collective noun for a set of genes, the Human genome has c.100,000 genes. 1953

GenGenomics: the move from studying single genes to analyzing and comparing whole genomes to understand how DNA influences disease and behavior.

GeoGeocentrism: theory that the Earth is the center of the universe; and the planets and Sun revolve around the Earth. First theory of the structure of the solar system. Declared so by Ptolemy, Aristotle, and adopted by the Church. It was the prevailing view until the 1600s when Galileo publicized Copernicus's 1543 Sun-centered system, heliocentrism. 335 BC-Aristotle, 150-Ptolemy, 1000, 1198, 1464-Epitome, 1536, '43, 1632, 1962

GeoGeographia: second century Ptolemy text and map of the known Western world, brought to Florence. 1400

GeoGeography: 900 BC, 150 BC, 910, 1000, 1519, '45-46, 1748, 1887

GeoGeological Evidences of the Antiquity of Man: by Lyell, in 1863, when he accepted Darwinism.

GeoGeology: the science of the physical structure and composition of the Earth. p.2, c.1000, '60, 1486, 1671, 1749, '95, 1815, '30-2, '38, '59, 1911

GeoGeometry: that area of math dealing with points, lines, and surfaces of solids, both Euclidian and non-Euclidian. 600 BC, 540 BC, 335 BC-Aristotle, 413, 524, c711, c.825, c.850, 1085, 1202, '25, 1430, '99, 1614, '33, '37, 1796, 1826, 1905, '15

Geometry, Elements of: by Euclid. c.300 BC

George 3: Obtuse English king during American Revolution, deposed as insane in 1811. 1765, '75

George, Henry: land reform, "At the bottom of every social problem we will find a social wrong."

Progress and Poverty. 1879

Germ theory of disease: Louis Pasteur. 1862

von Gesner, Konrad: *Biblioteca Universalis, Historia Animalium*, paleontologist, bibliographer. 1554

Gestalt psychology: regards all mental phenomena as being arranged in organized structured as opposed to being composed of simple sensations. The whole is different than the sum of its parts.

Gettier, Edmund: epistemologist. 1963

Gettysburg Address: dedicating a military cemetery. Abraham Lincoln. 1863

Gezari, Suvi: published a photo of a black hole engulfing a red giant star. 2012

Ghaddafi, Muammar: Libyan dictator, 2011

al Ghazali: conservative Muslim cleric, stifled Muslim scientists. 1085, 1150, 1273, 1714

Giambattista, Della Porta: founded the *Academy of the Mysteries of Nature*, first scientific society
Pope Gregory 13 closed it. 1560

Gibbon, Edward: *The Decline and Fall of the Roman Empire* 1776. p. 1, AD 45, 410, 1532, 1776

Gibbons, James: Cardinal, Baltimore, Catholicism is perfect, so it can't be improved. 1876 st

Gibbs, J. Willard: thermodynamics, 1875, *On the Equibrillium of Heterogeneous Substances*. 1875, '77

Gide, Andre: French writer. "Wisdom begins where the fear of God ends." p. 416-*The Index*.

Giffard, Henry: French, made and piloted a balloon powered by a steam engine. 1852

Gilbert, William: physician to the queen, said Earth is a magnet, *De Magnete*. 1600

Gilgamesh: Sumerian King, best known epic of Sumerian epics, which included *The Epic of Creation* and *the Poem of the Righteous Sufferer*. c2000 BC. 1872,

Gingrich, Newt: see Propaganda, this index

Gladstone, William: English PM, friend of Lord Acton. 1862

Glashow, Sheldon: physicist, with others, showed that the four fundamental forces were actually three, as two were really the same. Nobel 1968

Gleiser, Marcelo: astrophysicist, *A Tear at the Edge of Creation*. 2010

Gluon: an elementary sub-atomic particle. See Atom.

Gnostics / Gnosticism: early Christian sect, dualists, saw the world as evil, the creation of an evil creator, but the human soul was good and imprisoned in the world. The soul was capable of enlightenment (gnosis), possibly through a teacher. Jesus was one such teacher. 620 BC, 200, 321, 330, 538, 1147, 1160

Gobekli Tepe: in SE Turkey. Earliest known

man-made structures: not thought to be a religious site. c.9000 BC

de Gobineau, Joseph-Arthur: French, influential white supremacist. 1853

God: There are numerous concepts of gods, including monotheistic Gods and lesser gods. In some Eastern religions, God is simply a force in all imaginable phenomena. God in most modern Western theologies is one supreme all-powerful, all-knowing all-benevolent God.

The Christian, Jewish, and Muslim monotheistic Gods are called Abrahamic Gods as all trace to Abraham. All monotheistic religions have a particular set of beliefs as to the nature of their God. *The National Catholic Almanac* (1968) says the Catholic monotheistic God is "almighty, eternal, holy, loving, immortal, immense, immutable, ineffable, infinite, invisible, just, merciful, most high, most wise, omnipotent, omniscient, omnipresent, patient, perfect, provident, supreme, true, and incomprehensible. Most of these attributes are attributes of personality rather than of essence.

Most monotheistic religions have similar definitions but with some differences. These differences have historically been the (or at least the excuse) for horrendous wars and suffering.

The Muslim Koran / Qur'an has 99 names for its God / Allah, such as: Most Holy, Most Magnificent, Most Loving, Mighty, Gracious, Powerful, Compassionate, Beneficent, Merciful, Peaceful, Just, Forbearing, Great, All-knowing.

Protestantism: Martin Luther (1517) agreed that God was incomprehensible. Pantheists see God as a force in everything in nature. There are numerous different lesser holy entities (saints, etc) in most religions and cultures, historically and currently worshiped. They are thought to have limited supernatural power of some sort, like a god or goddess of the hunt or sea.

Carneades 150 BC: "The existence of God is not self-evident and therefore needs proof." Arguments for a God are characterized as metaphysical, logical, empirical, and subjective. Various persons throughout history have devised arguments to prove that their God exists who commands worship, obedience, and usually, some tangible tribute. The God most referred to herein is the Abrahamic God. The religious community in the US includes around 700,000 clergy and seminarians, plus persons in organizations and industries servicing the religious community. The Jewish monotheistic God is described in the

Hebrew Bible as all powerful

This book summarizes some arguments for the existence of God. Most purportedly rational arguments for God are inductive, not deductive, i.e., God by inference and God by default arguments where the conclusion is not certain but depend on the strengths of their premises. Inductive arguments for God are generally part of natural theology, i. e., that there are circumstances in the natural world that infer that a God exists or at least once existed.

As inferential arguments are not certain, faith is needed to believe them. Any God could of course remove all doubt about his existence simply by showing up. (pp. 405-8): Some arguments for God:

Christological Arguments,

Argument from Jesus's Wisdom

Argument from Jesus's Claim to be God

Argument from Resurrection

Argument from Religious Experience:

Aesthetic Argument,

Argument from Reason,

Argument from Desire,

Argument from Authority,

Argument from Consciousness,

Teleological / Argument from Design

Argument from Intelligent Design,

Ontological Arguments,

by Anselm, Spinoza, and Descartes

Presuppositional Argument, Van Til

Argument from Popularity, Wright

Argument from Eternal Truths, C S Lewis,

Argument from Remedying Injustice,

Argument from Preestablished Harmony,

Cosmological Arguments, (Aristotle, Aquinas)

God of the Gaps Argument,

Argument from Intuition, Rousseau

Deism, Edward Herbert

Anthropic Principle/ Argument from Fine Tuning

#

Arguments contra God's existence:

The Problem of Suffering / Evil, cited at 2000 BC, 1300 BC, 620 BC, 586 BC, 300 BC, 150 BC, AD 186, AD 274, 414, 524, 591, 1273, 1536, 1670, '88, 1710, '48, '51, '88, 1902, '20s, '25, '36, '40, '55, '63, '74, '79, '82, '90s, '92-93, 2001, '08)

Problem of Contrariety

Problem of Biblical Errors,

Problem of Divine Hiddenness, God's Inaction

Problem of a Silent God, God's Inaction

Problem of a Small God,

Problem of Poor Design

Problem of an Unknowable God,

God Paradoxes,

Problem of Hell,

Problem of Faith,

The No Reason Argument

Godel, Kurt: incompleteness theorems. 1931

Godfrey, Thomas: developed the octant. 1150

Godwin, William: political theorist. 1793

Goebbels, Joseph: Nazi, "Christ cannot possibly have been a Jew. I don't have to prove that scientifically. It is a fact." "Intellectual activity is a danger to the building of character." 1935

Göering, Hermann: Nazi leader, 1532, 1933

von Goethe, Johann Wolfgang: most prominent and influential German in his lifetime. *Faust*, (deal with the Devil (1801). "Art is long, life short, judgment difficult, opportunity fleeting." "An unused life is an early death." 1633, (1751), 1762, '72, 1808, '32, p. 423

de Gouges, Olympe: French. *Declaration of Rights of Women and the Citizen*. 1792

Gold, Thomas, Herman Bondi, and Fred Hoyle: posited a steady state model of the universe. 1948
Golden Age of Freethought: in the US. c.1870s-1910s
The Golden Bough, James Frazer, revolutionized modern anthropology. A collection of psychological and shades and discriminations. 1890

Golden Rules: several examples of the same idea from different cultures, 1300 BC, 530 BC, 1788, 1916

Goldman, Emma: feminist, "No real social change has ever come about without a revolution, 1655, 1924, pp. 457, 468

Goldwater, Barry: prominent conservative senator, "Frankly, these [Evangelical Christian preachers] frighten me. Politics and governing demand compromise. But these Christians believe they are acting in the name of God, so they can't and won't compromise. I know, I've tried to deal with them." 1964

Goleman, Daniel: 2005, p. 402

Gondwana hypothesis: South America, Africa, Arabia, Malagasy, India, Australia, New Zealand, and Antarctica and most of Southeast Asia were once one continent before they drifted apart. 1872

Gorki, Maksim / Alexei Peshkoff: "Truth is the god of the free man." 1932

Gospels of Matthew, Mark, Luke, and John: AD 70-90, AD 90-110, AD 177, AD 325, AD 356, AD 414-5, 1950, p. 414

Goths: barbarians, invaded Rome. 100, 337, 418, 410, '16, '75, '97, 400s

Gott, John: jailed for blasphemy. Jail killed him. 1921

Gould, Stephen Jay: eminent paleontologist: popularized punctuated equilibrium. 1972, '96

Graham: Billy: most famous US evangelical, 1949, 1958,

- 1971, 1988, 2001, '06, pp. 403, 416, 428
- Grammar of Science: The*, Karl Pearson. 1892
- Grand Inquisitor, The*: Dostoevski. 1880, p. 418
- Grand Synthesis*: The merger of Mendel's genetics and Darwin's Natural Selection, when both became generally accepted in the 1930s
- Grand Unified Theory* ("GUT"): a model in particle physics in which, at high energies, the three gauge interactions of the Standard Model (the electromagnetic, weak, and strong forces) are merged into a single force. Although this unified force has not been generally accepted, many GUT models theorize its existence
- Grant, Robert: evolutionist, taught Darwin. 1831
- Grapes of Wrath, The*: (Title from *the Battle Hymn of the Republic*, reference to *Revelation 14:17-20*). A novel of the Great Depression by John Steinbeck. 1939
- Graph: invented by Descartes. 1637
- Gratian: Bolognese jurist. 1140
- Gratuius, Otruin: pedantic Dominican. c.1515
- 'sGravesande, Wilhelm: His experiments said that kinetic energy is mass times velocity squared, as Leibniz said. Newton said it was simply mass times velocity They were both wrong: it's half mass times velocity squared. 1735, 1820
- Gravity*: for Newton, the attraction of every particle of matter in the universe to every other particle, with a force proportional to the product of the masses of the particles and inversely proportional to the square of their separation; for Clerk-Maxwell, gravity was a field of force; for Einstein, a curvature in space-time.
- Gravity is the weakest by far of the known forces in the universe. Gravity is the *pulling* force that keeps planets and lesser bodies like comets in their orbits and solar systems in their galaxy.
- Numerous mentions herein.
- Gray, Stephen: saw that electrons could flow on a wire. 1731
- Great Awakening, The*: evangelical movement in the U S in the 1730s-c.1750s
- Great Western Schism: two popes. 1378-1417
- Great War / (World War One) 1914-1919. War began when a Serbian shot the heir to the Austro-Hungarian throne. 1914
- Greece / Greek: p. 1, 3000 BC, 2000 BC, 1700 BC, 1470 BC, 1200 BC. From 900 BC to the time of Christ, many entries Greek-based, on pp. 9 to 30
- Greek Dark Ages c.1200-c.800 BC.
- Greek Way, The*: 1930, Edith Hamilton. 300 BC
- Greene, William: Monsignor. "Death in battle is God's way to populate heaven." 1950
- Greene, Graham: social critic, "I have never understood why people who can swallow enormous improbability of a personal God boggle at the idea of a personal Devil." p. 416
- Greer, Germaine: Freud is the father of psychoanalysis. It has no mother.
- Gregorian calendar: 1582, 1703
- Gregory 1 the Great: pope, "Faith hath no merit where human reason supplies proof." p. 1, 335 BC, 300 BC, 591, 1670, 2013
- Gregory 7: Pope, The Church never errs. 1073
- Gregory 9: Pope, slavery is OK. 1215, '33
- Gregory 10: Pope, sent two priests to China with the Polos, they soon turned back. 1272
- Gregory 12: Pope, he moved back to Rome from Avignon, so ended the Schism. 1417
- Gregory 13: Pope, praised the slaughter of the Huguenots. 1572
- Gregory 16: Pope, "absurd. . . raving, which.. defends liberty of conscience. . . the worst plague of all.. unrestrained liberty of opinion and freedom of speech." 1835
- Gregory: bishop of Nazianzus. 385
- Gregory, James: designed a reflecting telescope. 1663, '68
- Grew, Nehemiah: Brit, his *Anatomy of Plants* posited that plants reproduced sexually, 1682, '94
- Grim, Patrick: In the history of ideas, it's repeatedly happened that an idea, developed in one area for one purpose, finds an unexpected application elsewhere. Concepts developed purely for philosophy of mathematics turned out to be just what one needed to build a computer. Statistical formulae for understanding genetic change in biology are now in both economics and in programming."
- de Groote, Geert: holy lay man, founded the Brethren of the Common Life. 1418
- Grosseteste, Robert: English bishop/ 1200, '25, '69, '87
- Grotius, Hugo: international law, *Concerning the Law of War and Peace*: He introduced the concept of natural rights of individuals, 1536, 1600, '25
- Group theory: In politics, the 20th century theory the actions of groups acting in their interests are the most significant sources of policy and the substance of politics. Wealthier groups have far greater power disproportionate to their number.
- Grünbaum, Adolf: eminent philosopher, p. 417
- Guanilo: monk, refuted Anselm's *Ontological Argument*. 1076
- von Guericke, Otto: electric generator. 1650, '63, p. 423
- Guide for the Perplexed*: Maimonides. 1190
- Guild socialism, workers should control their crafts, and be responsible to the interests of society.
- Gulliver's Travels*: satire, Jonathan Swift. 1726
- Gutenberg, Gustavus Adolphus: invented the printing

press system, c.1454

Guthrie, Woody: author of *This Land is Your Land*.

(Chorus) This land is your land, and this land is my land. From the California to the New York Island. From the Redwood Forest, to the Gulf stream waters, God blessed America for me. This land was made for you and me.

Verse 1. As I went walking that ribbon of highway

And saw above me that endless skyway,

And saw below me the golden valley, I said:

This land was made for you and me. (Chorus)

V. 2 I roamed and rambled and followed my footsteps

To the sparkling sands of her diamond deserts,

And all around me, a voice was sounding:

This land was made for you and me. (Chorus)

V. 3 There was a high wall there that tried to stop me.

A sign was painted that said: Private Property,

But on the back side it didn't say nothing —

This land was made for you and me. (Chorus)

V. 4 When the sun come shining, then I was

strolling In wheat fields waving and dust

clouds rolling;

The voice was chanting as the fog was lifting:

This land was made for you and me. (Chorus)

V. 5 One bright sunny morning in the shadow of the

steeple. By the Relief Office I saw my people-

As they stood hungry, I stood there

wondering if God blessed America for me.

V.6 When the sun was shining and I was strolling

And the wheat fields waving and the dust clouds

rolling

The voice was chanting as the fog was lifting.

This land was made for you and me

(The lyrics were slightly changed in 1944. One version states, "God blessed this land for me." in place of "This land was made for you and me.")

H

Habitas: Frederick 1, origin of academic freedom. 1158

Hadith: sayings of Mohammed. 846, 1085

Hadley, George: climatologist movement of ocean in Hadley Cells,. 1735

Hadley, John: developed an octant to find latitude. 1731

Haeckel, Ernst: *Natural History of Creation*, 1862, 1901

Haight, John: 2013

Haldane, J B S: merged Darwinism and Mendel genetics, into the *Great Synthesis*. 1932, p. 436

Hall, Asaph: discovered Mars's moons. 1877

von Haller, Albrecht: Nerves control muscles. 1766

Halley, Edmund: astronomer, friend of Newton, Halley's comet. 250 BC, 168 BC, 1250, 1600, 1684, 1686, 1705, 1759, 433

Hamilton, Alexander: *Federalist Papers*-arguments

adopt the *U S Constitution*, a monarchist. 1776, '87, pp. 456, 460, 467

Hamilton, Edith: *The Greek Way* 1930. 300 BC

Hammurabi Code: Eye for Eye. 1750 BC, 1300 BC 586 BC

Hamsworth, Harold / First Viscount Rothermere, Brit., fascist, owned the Daily Mail. 1933

Han Ying: Chinese, snowflakes have 6 sides. 136 BC

Harlan, John Marshall: Supreme Court Justice, the sole dissenter in *Plessy vs, Ferguson* 1896

Hamont, Matthew: denied Jesus's divinity, so burnt him at the stake. 1579

Han Dynasty. 100 BC

Hancock, John: revolutionary, in 1776 signed the *Declaration of Independence*. 1773, 1789

Harari, Yuval Noah: *Sapiens*, 1484, 1532, 1933, 2014-5, '18, pp. 394, 398, 402, 420, 440

Harding, Warren: US president 1921-'23. died in office. Several scandals revealed after he died. 1920

Harris, Sam: atheist, 2011, '12, '20 pp. 399, 415, 438

Harrison, John: made a marine clock so accurate that it could determine longitude. 1761, '72-75

Harvey, William: physician, blood. 1628, 1661,

Hawking, Stephen: astrophysicist, cosmologist, proponent of the theory that the universe is uncaused and the c.1974 theory that black holes emit radiation . 1669, 1927, '83, '87, '92, 2010, '12

al-Haytham: *The Treasury of Optics*, 1020, definitive text on optics. 300 BC, 1000, '20, '85, 1122, '25, 1247, '67, 1430, 1590, '95, 1644

ibn Hayyan, Jabir: "father of Chemistry." 790

Hazlitt, William: philosopher. 1819

Health tips from the famous Galle Face Hotel, Colombo, Sri Lanka: "Galle Face Hotel admires your decision not to smoke". "It's good for you. Please walk down. It's only two flights."

Heat: a/k/a internal thermal energy of a body, the agitation of atoms or molecules of matter. Heat only transfers from a warmer body to a cooler one. Specific heat is the heat capacity of a body. 250 BC, 1619-20, '66, '87, 1738, '83, '87, '95, '99, 1802-3, '19, '24, '31, '40, '47, '52, '56, '75, '77, 1900, '11

Heat pump. Gets get heat from a cold substance (like air) How? First understand a usual refrigerator: It separates air into warm air and colder air. It then and discards the warmer air into the kitchen and pipes the colder air into the refrigerator. A heat pump does the same. It also separates cold air into warm air and much much colder colder air. It dissipates the much colder outside and uses the warmer air to heat the house.

Heaven / paradise: religious concept of a good life in the presence of a God after death. A useful

concept for the clerical and civil ruling class as belief in such afterlife forestalls complaints regarding the miseries of current life and encourages obedient behavior. 3000 BC, 2700 BC, 2400 BC, 1046 BC, 620 BC, 530 BC, 399 BC, AD 30, AD 45, AD 50, AD 200, 325, 413, 538, 622, 630, 644, 789, 1000, '54, '95-6, 1273, 1310, 1632, 1755, '79, 1830, '64, '79, 1912, '16, The Heavens: sky, space. 8000 BC, 450 BC, 335 BC-Aristotle, AD 45, AD 50, 1020, 1572, 1600, '05, '32, '66, 1755, '74

Heaviside, Oliver: replaced Clerk-Maxwell's electromagnetic potential field by "force fields" as the heart of electromagnetic theory. He simplified Clerk-Maxwell's theory to four differential equations, now known as *Maxwell's Equations*, 1881, pp. 430-341

Hebrew Bible /Old Testament: 2000 BC, 1300 BC, 900 BC, 586 BC, 300 BC, AD 45, AD 150, AD 200, 610, 644, 1095, 1160, 1517, 1762, '83, 1865, 2013

Hedonism: the doctrine that pleasure is the actual, and also the proper, motive of every choice.

Hegel, George Wilhelm: philosopher, concept of absolute spirit, the world of ideas progresses by "thesis, antithesis, synthesis," over and over. 1768, 1820, '41, '45, '48, '59, '81

Heidegger, Martin: *Being and Time*. 1927

Heine, Heinrich: German poet. 1850, p. 418-Index

Heisenberg, Werner: uncertainty principle. 1925, '27

Heliocentrism: Sun centered planetary system. 2700 BC, 146 BC, 1031, 1514, '36, '43, '45, '72, 1600, '09-Kepler, '13-16, '24, '32-3, '44, '64, '87, 1786-87, 1800, '60

Helium: two protons. p. 2, 1860, 1939, '48, '53

Hell: in most religions, an afterlife of eternal pain. For Dante, a place with interesting people. AD 45, AD 70, 413, 610, 644, 1150, 1306, '10, 1516, 1651, 1787, 1864

von Helmholtz, Hermann: discovered *First law of Thermodynamics*, "Who seeks practical utility in science, seeks in vain." Also invented the ophthalmoscope to see inside the eye 1847, '51

Heloise: student of, lover of, wife of, Abelard; mother of Astrolabe, later a nun. c.1122

Hensley, Gary: Army chaplain, a fundamentalist. 3% of military personnel are Evangelicals. But 87% of applicants to be military chaplains are Evangelicals and over 60% of chaplains are Evangelicals. 2009

Helvetius, Claude: Adrien, deist, *De l'Esprit*, 1758

Individuals differences are due only to education, i.e., nurture, in the nature vs. nurture debate. 1758

Hemingway, Ernest: (1899-1961), *Farewell to Arms*, "Old men do not grow wise. They grow careful. Never mistake motion for action." 1929, 37, 40, 46, 52

Henry 3: HR Emperor, French, deposed two popes and made Clement 2 pope, who returned the favor and crowned Henry as Emperor. 1058

Henry 4: French king, *Edict of Nantes*. 1589

Henry 7: English king, sponsored the Cabotos/ Cabots' explorations of North America. c.1500

Henry 8: English king, declared himself head of the Christian Church in England. 1500, '24, '33

Henry, Prince, the Navigator: Portugal. 1419, '50, '97

Henry's Law. In physical chemistry, a gas law that states that the amount of dissolved gas in a liquid is directly proportional at equilibrium to its partial pressure above the liquid. 1803

Hera: Greek goddess of women. 750 BC,

Heraclides: posited that the Earth revolves, and that Venus and Mercury orbit the Sun. c.350 BC

Heraclitus: Greek, All is in a state of flux. c500 BC

Herbert, Edward: founded deism. c.1624

Herbert, George: "The rich knows not who is his friend."

von Herder, Johann Gottfried: father of modern nationalism, humanist. 1769, '72

Heretic: For Catholics, "any baptized person, retaining the name Christian, who pertinaciously denies or doubts one or another truth believed by divine and Catholic faith." Popularly, one who does not belong to the speaker's religion. One religion's heretic can be another religion's saint. 586 BC, 200, 325, '92, 413, 750, 1121, '47, '84, 1208, '50, '73, 1376, 1414, '40, 1516-7, '25, '36, '45, '14, '50, '89, 1820, 1907, '78

Hermeticism: 15th century religious movement. c.1450

Hero: Greek, taught mathematics at Alexandria

developed a simple useless steam engine. AD 50

Herodotus: Greek, first "historian". 490 BC, 1514

Herophilus: c AD 100 first known anatomist, at the Library in Alexandria. 300 BC

Herschel, William: discovered Uranus. 1781, saw nebulae 1786, founded spectroscopy 1800, saw binary stars 1802. Said our Sun is in a galaxy of millions of stars. 1624, 1785, 1800, pp. 425, 433-4

Hertz, Gustav: physicist, electrons. 1912

Hertz, Heinrich: electricity. 1887

Hertzprung, Enjar: 1908, discovered correlation between brightness and size of star. p. 434

Hess, Henri: thermochemistry. 1840

Heuristic: a method of research.

Heyerdahl, Thor: sailed a reed boat, Peru to Polynesia, proved colonization of Oceania from S. America was possible. 1947

Hick, John: (1922-2012) Christian theologian, advocate of religious pluralism. 1966. '88 p. 453

Higgs boson: an elementary particle that gives mass to other particles. See Atom, 2013

Hilary: bishop of Poitiers. AD 355

- Hill, Joe (1879-1915): American folk singer, social critic, labor organizer. killed by the Utah governor.
The Preacher and the Slave (1916) :
 “Long-haired preachers come out every night.
 Try to tell you what's wrong and what's right.
 But when asked how 'bout something to eat.
 They will answer with voices so sweet,
 [Chorus] You will eat, bye and bye
 In that glorious land above the sky.
 Work and Pray, live on hay.
 You'll get pie in the sky when you die.
 [Chorus] And the starvation army, they play.
 And they sing and they clap and they pray.
 Till they get all your coin on the drum.
 Then they tell you when you are on the bum.
 [Chorus] If you fight hard for children and wife.
 Try to get something good in this life.
 You're a sinner and bad man, they tell.
 When you die you will sure go to hell”.
- Hindu /Hinduism: 18th century Western name for the widely varied religious and philosophical beliefs of Hindustan / India but which had two common basic beliefs, the caste system and reincarnation. 2000 BC, 1300 BC, 620 BC, 528 BC, 510 BC, 400 BC, 325 BC, AD 45, 50, 499, 879,1500, '60, 1663, 1750, 1875, 1927, 47
- Hindustan/Hindoostan: (Land of the Hindus)
 Western name for India until the mid-19th century.
- Hipparchus: astronomer, charted 850 stars. 146 BC
Historia Animalium: 1551, von Gesner. 1543
Historia Plantarum: Theodore of Gaza. 1483
Historical and Critical Dictionary: written "to destroy the vices of religion," Pierre Bayle. 1697
Historie Universelle, Voltaire. 1753
- History: Will Durant, “History remains at bottom a natural selection of the fittest individuals and groups in a struggle wherein goodness receives no favors, misfortunes abound, and the final test is the ability to survive.”
- History: Hearst newspapers reported that Teddy Roosevelt led a calvary charge of “Rough Riders” up San Juan Hill in the Spanish American war. (In fact they walked up; their horses were in Florida. When Roosevelt got to the top, he was met by a company of American Negro soldiers who had gotten there first.) What's in history books?
History of Florence : 1525, Niccolo Machiavelli, 1532
History of the Conflict Between Religion and Science. By John Draper. 1886
- Hitchens, Christopher: Brit, writer, philosopher, atheist. *God is not Great*. “Life is quite possibly a joke . . . often a joke in extremely poor taste. Life is a sordid mess. We are all born into a losing struggle. Fear is the mother of superstition. Religion poisons everything.” Hitchens often said, “There is no ethical principle that a believer could make that an atheist could not make.” 1751, 2015
- Hitler, Adolf: the universal example of a despicable evil person. German dictator. He caused misery and death to millions of innocents. Said, “The great masses of people . . . will more easily fall victims to a great lie than a small one.” “Through clever and application of propaganda, people can be made to paradise as hell, and also the other way round, to consider the most wretched sort of life as paradise.” “Anti-Semitism is a useful revolutionary expedient. My Jews are a valuable hostage given to me by democracy.” When Germany lost the war he killed himself. *Mein Kampf / My Struggle*, 1924. 1543, 1751, 1921, 24-25, '28-29, '35-43, '45-46, '75, pp. 398, 400, 417,
- Ho Chi Minh: liberator of Viet-Nam, 1945
- Hobbes, Thomas: *Leviathan* 1651, materialist, “Life in nature is "solitary, poore, nasty, brutish, and short.” c.8000 BC, 1532, '86, 1600, '09, '24, '33, '37-8, '51, '70, '89, 1719, '25, '62, 1800, '59, '65, 1973, p. 418-
Index
- Hoffer, Eric: stevedore, philosopher. 1887, 1963
- Hofstadter, Douglas: 2013
- d'Holbach: Baron, Paul Henri Thiry, philosophe, atheist, wrote for the *Encyclopedie*. “All religions are ancient monuments to ignorance, superstition, ferocity; and modern religions are only ancient follies rejuvenated.” 8000 BC. 1700, '51, '61
- Holism: any view that emphasizes the whole as distinct from any of its parts. In psychology, a term coined by John Dewey, which advocates studying a whole organism, as distinct from its parts.
- Holmes, Arthur: plate tectonics. 1944
- Holmes, John Jaynes: If Christians were Christians, there would be no anti-Semitism. 1933
- Holmes, Oliver Wendell, Jr.: Supreme Court Justice. “The life of the law has not been logic. It has experience.” “Approving the sterilization of very low people, he said,” Three generations of imbeciles
- Holocaust: German killing of c.6M Jews. 1948,
- Holy Roman Empire: ("HRE"): 26, 789, 799, 1046, '73, '85, '98, 1305, '24, 1414., '31, '53, 1517,"45
- Holyoake, G J: English social reformer, doubted God. So he was jailed. 1842
- Home, Henry / Law Lord Kames: Edinburgh, mentor of David Hume, influential jurist of the *Scottish Enlightenment*. “We sit to enforce right, not to enforce wrong.” 1725, '34, '77, '79
- Homer: non-literate Greek poet, reputed author of *The Iliad* and *The Odyssey*. 900 BC, 387 BC, 335 BC-Aristotle, 25 BC
- Hominids: all modern and extinct great apes, gorillas,

- chimps, orangs, bonobos, and humans, and their immediate ancestors. They had the primate's opposable thumb. Only *Homo sapiens* had a large brain. 7M BC, 1735, 1996
- Hominins:** a subset of hominids. Any species of early humans more closely related to humans than chimps. Generally, it includes the *Genus Homo*, but excludes the genus *Gorilla*. *Hominins* walked upright, their skulls rested on top of the spine, not forward like apes. They made tools, had a larger brain, developed language. 7M BC, 1.9M BC, 700K BC, 500 BC, 1973, 2013
- Homo erectus*:** early extinct *Homo* species: had fire. Only found in China. 1.9M BC, 700K BC, 1892
- Homo ergaster*:** first long legged hominin. 1.9M BC
- Homo habilis*:** extinct *Homo* species. 2.1M -1.5M BC
- Homo heidelbergensis*:** probable ancestor of *Homo sapiens* and *Homo neanderthalensis*.
- Homo naledi*:** extinct *Homo* species. Remains found in South Africa in 2013, 5' tall, brain size of orange, buried its dead.
- Homo sapiens*:** only surviving *Homo* species. 7M BC, 1.9M BC, 370K BC, 200K BC, 60K BC, 30K BC, 20K BC, 18K BC
- Honorius 3: Pope. 1217
- Hooke, Robert: *Micrographia* 1665, first curator of experiments, *Royal Society*, rival of Newton. 1250, 1600, '56, '65-6, '70, '75, '84, '87, 1704
- Hooker: Joseph: urged Darwin to publish *Origin of Species*, later president of *Royal Society*. 1860
- Hoover, Herbert, US pres, 1929-33. Smedley Butler an iconoclastic Marine general, relates that in 1900, Hoover then a mining engineer in China during the Boxer rebellion, during the siege of Tientsin, had been caught hiding with the women while every man was enlisted and armed to protect the city. 1925, '29, '36, '40.
- Horse: The family equidae (horses, donkeys, zebras) is native to the Americas. Fossils show horse origins here over tens of million years ago, their extinction due to the last Ice Age c.10,000 BC (Mules are donkey father, horse mother.)
- "How" versus "why": How asks "by what means or method?" "Why" asks "For what reason or purpose?"
- Hsiung-nu: Mongolian nomads, invaded China, AD 100
- Hubble, Edwin: *Cepheids in Spiral Nebulae*, *Hubble's Law*. 1755, 1924, 1929-30
- Hubble's Law:** the further away the galaxy, the faster it recedes, so the universe is expanding. 1929, '64
- Hubble Constant:** the rate the universe is expanding.
- Hubble Sequence:** Hubble devised a system of classifying galaxies by their shape, 1929
- Hubble Space Telescope: launched in low earth orbit in 1990. p. 437
- Hudson, Gordon, 2012
- Huggins, William and Margaret, discovered the Doppler shift of light from the star Sirius, as predicted by Doppler 1868
- Hugh of St. Victor Abbey: Study everything. 1130
- Hugo, Victor: *Les Miserables*, 1140, 1847
- Huguenots: French Protestants. 1572
- Hui-neng: Buddhist teacher. 677
- Hulagu Khan: grandson of Genghis, burned Bagdad.
- Human Sacrifice, 2000 BC, 586 BC, 1519
- Humanism: Human philosophy that affirms the dignity of human life and rejects supernaturalism. The American Humanist Association says Humanism is "a rational philosophy informed by science, guided by reason, inspired by art, and motivated by compassion. Affirming the dignity of each human being it supports liberty and opportunity consonant with social and planetary responsibility. Free of theism and other supernatural beliefs, humanism derives the goals of life from human need and interest rather than from theological or ideological abstractions and asserts that humanity must take responsibility for its own destiny." Humanism is a type of naturalism; not the other way around 2000 BC, 1217, 1300, '39, '52, '97, 1473, '86, 1512, '17, '25, '80, 1633, 1772, 1863
- Humason, Milton: with Hubble, formulated *Hubble's Law*, 1924. 1929,
- von Humboldt, Alexander: eminent naturalist geographer, in his time, second to Napoleon as most famous man in Europe. 1799
- von Humboldt, Wilhelm: brother of Alexander, Prussian, linguist, education reformer. 1810
- Hume, David: Edinburgh, most important philosopher to write in English. a leader of the *Scottish Enlightenment*, *Treatise of Human Nature*. *On Civil Liberty*, *Essay on Miracles*. *Concerning Human Understanding*. *Dialogues Concerning Natural Religion*. *Enquiry concerning Morals*. 8000 BC, 335 BC-Aristotle, 300 BC, AD200, 413, 1273, 1586, 1663, '37, '51, 1714, '29, '48, '51-'62, '79, '81, '89, '95, 1859, '79, 1920, '22, '74
- Hume's law:** informal name for a distinction between statements of fact and statements that have an "ought" in them. Hume: utterances with "ought" in them could not be logically derived from statements of fact. (But there are many reasonable exceptions) 1739
- Humphrey, Hubert H: The right to be heard does not automatically include the right to be taken seriously.
- Huns/Hsiung-nu nomads: Mongolian 150 BC, 100, 410, 475
- Hunt, James Henry Leigh: Brit, poet.
About Ben Adhem (may his tribe increase!)
Awoke one night from a deep dream of peace,
And saw, within the moonlight in his room,
Making it rich, and like a lily in bloom,
An angel writing in a book of gold:—
Exceeding peace had made Ben Adhem bold,
And to the Presence in the room he said
What writest thou? The vision raised its head,
And with a look made of all sweet accord,
Said "The names of those who love the Lord."
"And is mine one?" said Abou. "Nay, not so,"

Replied the angel. Abou spoke now more low,
 But cheerly still, and said "I pray thee, then,
 Write me as one that loves his fellow men."
 The angel wrote, and vanished. The next night
 It came again with a great wakening light,
 And showed the names whom love of God
 had blessed,
 And lo! Ben Adhem's name led all the rest."

Hunter, John: Scot, turned surgery from a barber's part-time job into a scientific discipline. 1770s

Hus, Jan: Rector of Karlova Univ., Prague, preached against the corrupt clergy; so the pope killed him. 1378, '98, '09, '14, 1517,

Hutcheson, Francis: an Ulster Scot, philosopher, political theorist, a leader of the Scottish *Enlightenment*. 1725, '68, '76, '89

Hutton, James: geologist, *A Theory of the Earth, with Proofs and Illustrations*. 1795

Huxley, Aldous: *Brave New World* 1932 (title from Shakespeare's *The Tempest*). 387 BC, 380 BC, 1532, 1779, 1880, 1932, '44

Huxley, Julian: explained Darwin. 1859, 1905

Huxley, Thomas H: coined the term "agnostic." *Evidences as to Man's Place in Nature* 1860, *Science and the Christian Tradition*, Ape or bishop, proponent of Darwin's evolution, popularized *Darwinism*. 387 BC, 1761, (1847), '56, '59-60, '64, '93, 2000, pp. 410, 514

Huygens, Christiaan: formulated the *wave theory of light* in 1678, only published in 1690. 1600, '56, '70, '87, '90, 1803, '66, 1900

Hydrogen bomb: A *fusion* thermonuclear bomb that uses a *fission* atom bomb as a fuse. The US detonated one in 1952 on a pacific island 450 times as powerful than the *fission* atom bomb used at Nagasaki.

Hydrodynamica: Daniel Bernoulli, laid the basis for the kinetic theory of gasses. Gasses are innumerable infinitesimal particles (atoms or molecules) bouncing against one another, the hotter, the more bounce / pressure. 1738

The Hydrostatic principle: the pressure of a liquid at the bottom of an open vessel depends solely on the height of the liquid, not the shape of the vessel. Simon Stevin. 1585

Hypatia: a famous teacher in Alexandria, Christian monks took her to their quarters, tortured her to death for being a pagan.

Hyperprosociality, Paleoanthropologist Curtis Marean's theory that a key trait of *Homo sapiens* that allowed them to leave Africa 70,000 BC was their ability to cooperate with unrelated persons.

I

Ibsen, Henrik: Important social critic. "The majority has the might- more's the pity -but it hasn't the right . . . The minority is always right." "Rob the average man of his life illusions (saving lies) and you rob him of his happiness." *An Enemy of the People*. *The Doll House*. 1847

Id: For Nietzsche, the most basic level of human nature, like Schopenhauer's will. Freud popularized the "id". Neurologically, id is in the amygdalae, a region in the temporal lobes of brain. It responds to fearful faces . Thus signs of danger are processed by the unconscious id before they enter consciousness. 1900-39-Freud Idealism: in metaphysics, the doctrine that ideas, or thought, are the fundamental reality; in ethics, the devotion to moral ideals. the view that subordinates all existence to thought, emphasizes the critique of knowledge as a means of reaching philosophical conclusions, rejecting utilitarian ethics and stressing mind over matter, 1755, 1820s, '41, '46-8

Ideas: John Maynard Keynes, Ideas shape the course of history. A study of the history of opinions [books like this] is a necessary preliminary to the emancipation of the mind.

Samuel Taylor Coleridge, The wise only possess ideas; the greater part of mankind are possessed by them"

Fyodor Dostoevski, Neither man nor nation can exist without a sublime idea. 1880

Nicolas Chamfort, There are well-dressed ideas just as there are well-dressed fools.

Don Marquis, An idea isn't responsible for the people who believe it.

Somerset Maugham, There are few minds in a century that can look upon a new idea without terror.

George Seldes, All great ideas are controversial, or have been at one time.

Samuel Johnson, That fellow seems to me to possess but one idea, and that a wrong one.

Victor Hugo, *Les Miserables* 1862, "Nothing else in the world, not all the armies . . . is so powerful as an idea whose time has come. 1624, 1847.

Sir Frederick Banting, No one has ever had an idea in a dress suit.

Walter Lippmann. Men are mortal. Ideas are immortal.

Aldous Huxley, The vast majority of humans dislike and actually dread all notions with which they are not familiar . . . innovators have always been derided as fools. 1932

John Stuart Mill, No idea can be justified unless it is open to opposition.

Anatole France, "To die for an idea is to place a pretty high price upon conjecture."

Oscar Wilde: An idea that is not dangerous is unworthy of being called an idea at all (1890) (also attributed to Elbert Hubbard and Don Marquis).

P W Bridgeman, There is no adequate defense

- against the impact of a new idea, expect stupidity. Emile Chartier, Nothing is more dangerous than an idea, when it's the only one we have.
- Mao Tse-Tung, [Correct ideas] come from social practice, and it alone.
- #
- Ideology:** a set of beliefs, theory of knowledge and values. Ideology is a partial truth presented as if it were universal truth. 2K BC, 620 BC, c644,
- Identity politics:** politics based on a particular identity, such as ethnicity, race, nationality, religion, denomination, gender, sexual orientation, social background, caste, and social class. Harold Isaacs, It does not merely distinguish. It divides.
- Idols of the Mind:* mislead thinking, Francis Bacon. 1620, 1956, '75
- Ignatius of Loyola:** Saint, a Basque, founded the Order of Jesus / Jesuits. 1539, '45, 1918
- Ignostic:** One who can't say if he is a theist or atheist until he sees a sufficient coherent definition of God, Rabbi Sherwin Wine (Humanistic Semitism). 1960s
- Iliad:* attributed to a blind poet named Homer, with the Odyssey, taught Greeks culture. 900 BC
- Imitation of Christ:* Thomas a Kempis, 1428
- Immortality of the Soul: On the.* Pietro Pomponazzi. 1516
- Incandescence,** light emitted by heating a material to a high temperature.
- Incas:** ruling family of a pre-1492 civilization in Peru, destroyed by Spaniards-Pizarro. p.1, 2000 BC, 450, 1500, '19, '32
- Incoherence of the Incoherence:* Averroes. 1150
- Incoherence of the Philosophers,* al-Ghazali. 1085
- Independence.** 509 BC, 374, 1273, 1400, 1776, '89, '20s, 1909, '11, '45, '47, 2013
- The Index of Prohibited Writings:* Writings that Catholics may not possess or discuss. The last publication (1948) had a introduction by Cardinal Rafael Merry del Val written in 1929 which said the Church was "facing a struggle led by the Devil himself, of "malicious publications" arguing that "no other danger is greater." 1310, '32, '45, '59, '80, 1601, '09, '16, '37, 1848, 1907, '66, Many banned authors named on p. 416
- India, Indian:** (referring to the country). formerly Hindustan (Land of the Hindus). 8000 BC, 3500 BC, 2000 BC, 620 BC, 600 BC, 528 BC, 504 BC, 490 BC, 430 BC, 334 BC, 325 BC, 150 BC, 150, 499, 550, 628, 711, 825, 900, '32, 1000, '60, 1202, 1300, '25, 1405, '33, '37, '40, '97, 1500, '41, '85, 1750, 1800, 1927, '47-independence.
- Indians / Amerindians:** were mistreated worse than Black Americans. 1519, '41, 1765, '73, 1830, 1942, '63
- "Individual liberty vs. the common good:" basic opposing themes of government in political theory. Woodard. 507 BC, 1788, 1921, 2016, p. 456
- Induction:** in logic, going from particular premises to a general conclusion; the better the premises, the better the conclusion, which is an inference and is "valid" if it follows its premises even though it may be wrong if its premises are faulty. P. 1, 425 BC, 335 BC- Aristotle, 200, 1020, 1268, 1486, 1500, 1600 '20, '87-Newton, 1739, 1824, '31, '63, '96, 1920s
- Induction:** in electricity, either adding to or taking electrons from a body. 1877, '83
- Indulgence:** Clerical forgiveness or reduction in a penalty for a sin. Applicable also to dead persons who are in Purgatory sitting out their penance before they can enter heaven. Usually for a fee. 1054: '95: 1300: 1509: '16-7: '45
- Industrial Revolution:** 1765, '76, 1800, '48, '67
- Inertia:** 450 BC, 390 BC, 549, 1331, 2589, 1612-13, '33, '65, '87-Newton, 1896, 1905-07, '15, 1950, See also Momentum and Motion, p. 450
- Infallible:** incapable of error. 413, 1870.
- Infidel:** Ambrose Bierce: In New York, one who does not believe in the Christian religion. In Constantinople, one who does, 750, 1859-60, 1896
- Information theory:** Leo Szilard. 1934
- Infinite Universe and Worlds, On the*, Giordano Bruno 1586
- Ingenhousz, Jan:** oxygen in plants. 1779
- Ingersoll, Robert G:** the leader of the *Freethought Movement*. He believed, "Happiness is the only good, reason the only torch, justice the only worship, humanity the only religion, and love the only priest."
- Helen Hart Gardiner,** first female Civil Service commissioner, said, "He knew the difference between belief and knowledge." p. 1, 1095, 1532, 1751, 1870
- Inniss, Patrick:** Skeptic, 1940
- Innocent 2:** Pope, ran *2nd Lateran Council*. 1139
- Innocent 3:** Pope, promoted crusades. 1198, 1202, '08-9, '15,
- Innocent 4:** Pope, *Ad extirpada*, authorized torture for "possible" heretics. 1252
- Innocent 8:** Pope, *Summa Desidantes*, allowed torturing and killing "possible" witches. 1484, '86, '92
- Innocent 10:** Pope. 1648
- Inoculation:** an injection of a mild disease prevents a worse related one. Used in Turkey and China centuries before the West. 1770s, '96, 1862
- Inquiry Concerning Moral Good and Evil:* Francis Hutcheson. 1726
- Inquisition:** Christian institution established to punish heretics with torture, murder, and/or imprisonment

for having or expressing “heretical” ideas; in reality, ideas critical of the clergy. 1184, 1215, ‘29, ‘33-4, ‘73, 1305, ‘17, 1440, ‘78, 1500, ‘19, ‘36, ‘42, ‘53, ‘60, 1600, ‘14, ‘19, ‘33, ‘55, ‘89, 1820s, ‘87, 1996

Instrumentalism: the doctrine that ideas are instruments of response and adaptation, and that their truth is to be judged in terms of their effectiveness

Intelligence: “quickness to apprehend, as distinct from ability, which is capacity to act wisely on the matter apprehended . . . Our minds are finite, and yet even in these circumstances of finitude we are surrounded by possibilities that are infinite, and the purpose of human life is to rasp as much as we can out of the infinitude.” Alfred North Whitehead. The more common definition is simply “Ability to understand.”

Intelligent Design: an amateurish re-write of the *Design / Teleological Argument*. 1986, 1996-7, 2005-6, pp. 405, 413, 422, 472

International law: Hugo Grotius. 1536, 1625, 1750

Intracellular Pangenesis: Hugo de Vries. 1889

Intuitionism: in metaphysics, the doctrine that intuition, rather than reason, reveals the reality of things; in ethics, the doctrine that humans have an innate sense of right and wrong.

Investiture dispute: in Medieval times, who gets to appoint clergy, the Church or kings. 1054

Ion, an atom with an uneven number of positive and negative electrical charges

Ionization: when an atom gains or loses an electron.

Irenaeus: bishop, God inspired the gospels. AD 186, 1751

Iron Age: followed the Bronze Age. c.11000 BC

Iron law of Wages: David Ricardo, Brit., banker. Wages must be kept down to keep profits up. 1817

Irrational number: a number that can't be expressed as a fraction

Isaac, son of Abraham: reputedly spared from being sacrificed. c2000 BC

Isabella: queen, with Ferdinand, ruled Spain, financed Columbus, directed the Spanish Inquisition. 1492

Isidore: Saint, Archbishop of Seville. 591, 789

Isis: Egyptian goddess. 300 BC, AD 45

Islam / Islamic: an Abrahamic monotheistic religion founded c610 by Mohammed, teaching that there is only one God/ Allah, and that Mohammed is his messenger. It is the world's second-largest religion with over 1.8 billion followers or 24% of the world's population, Muslims are a majority in 50 countries.

The primary scriptures of Islam are the *Qur'an*, viewed by Muslims as the verbatim word of Allah, and sayings of Mohammed called *hadith*. Muslims believe that Islam is the complete and universal version of a primordial faith that was revealed before

through prophets including Adam, Abraham, Moses and Jesus.

Muslims consider the *Qur'an* in its original Arabic to be the unaltered and final revelation of God. Mohammed wrote the *Qur'an* purportedly advised by the angel Gabriel. It lays out a comprehensive unitary religious and civil state. Islam spread quickly, principally by conquest. Winston Churchill criticized it, “How dreadful are the curses which Mohammedanism lays on its votaries! Besides the fanatical frenzy,

. . . there is this fearful fatalistic apathy. The effects are apparent in many countries. Improvident habits, slovenly systems of agriculture, sluggish methods of commerce, and insecurity of property exist wherever the followers of the Prophet rule or live.” Islam rejects democracy and is intolerant of every other religion. “In Mohammedan law every woman must belong to some man as his absolute property – either as a child, a wife, or a concubine. Were it not that Christianity is sheltered in the strong arms of science, the science against which [Christianity] had vainly struggled, the civilization of modern Europe might fall.” Numerous mentions of Islam starting at 610

Islam, Five Pillars of: 640

Islam versus Islamism. Daniel Pipes, “Islamism is an ideology that demands man's complete adherence to the sacred law of Islam and rejects as much as possible outside influence, with some exceptions (such as access to military and medical technology).

It is imbued with a deep antagonism toward non-Muslims and has a particular hostility towards the West. It amounts to an effort to turn Islam, a religion and civilization, into an ideology. . . . Islamism turns the bits and pieces within Islam that deal with politics, economics, and military affairs into a sustained and systematic program . . . Islamism is, in other words, is a 20th century radical utopian scheme. Like Marx-Leninism or fascism, it offers a way to control the state, run society, and remake the human being. It is an Islamic-flavored version of totalitarianism.”

Isomer: compounds with same chemical formula, but different molecular structures, 1824

Isotope: a chemical element with the same number of protons as another but differing in some way such as by its radioactivity or by a different number of neutrons. 1869, 1932, ‘39

Ito, Hirobumi: Japanese PM, philosopher. 1903

J

al Jahiz / 'Amir ibn Bahr al-Kinari al-Basri al-Jahiz: *Book of Animals*. c.820

Jainism: the belief that the mythologically conceived world is eternal and subject only to the fixed sequence of six ages, good and bad, but not periodic creation and destruction. It denies a creator god 620 BC, 528 BC, 510 BC

James, Constantin: criticized Darwin in 1877. So Pius 9 made him an officer of the Papal Order of St. Sylvester. There are no required affirmative duties. Members can wear the uniform and decorations of the order and may ride a horse in St. Peter's Basilica. (Bob Hope was also so honored). 1877

James, William: American philosopher. "Religion in short, is a monumental chapter in the history of egotism." "Philosophy is mostly biography." 1890

Jansen, Sacharias and Zacharias: microscope. 1595

Japan/Japanese. 20K BC, 2000 BC, 500 BC, 150 BC, 604, 644, 1258, 1500, 1633, 1700, '50, 1903, '39

Ibn Qayyim al-Jawziyyah: astronomer, said the *Milky Way* was a myriad of tiny stars packed together in the sphere of the fixed stars. 1320

Jefferson, Thomas: 3rd president of the US, main author of the *Declaration of Independence*, deist. "The whole of government consists in the art of being honest." 1532, 1624, '85, 1748, '76, '85, '89, 1800, 1945

Jefferson Bible: Misleading name of a book of the words of Jesus with no divine references. Compiled by Thomas Jefferson. 1820

Jenkins, Alejandro: physicist, 2011

Jenner, Edward: doctor, inoculation, 1770s, '96, 1862

Jerome: St., translated the *Bible* from its original Greek, Hebrew, and Aramaic into Latin, known as the *Vulgate Bible*, now the official Roman Catholic *Bible*. p. 461

Jessel, George: In the 1930s, took Lena Horne, a beautiful well known Negro singer to the famous Stork Club, which had an unwritten policy of not admitting Blacks. The maitre'd, embarrassed, searched for a way to deny them entry. Finally he said, "Who made your reservation?" Jessel said, "Abraham Lincoln."

Jesuits: Catholic order founded by Ignatius of Loyola. 1414, 1529, '45, 1609-10, '19, '24, '31-3, '44, '70, 1710, '33, '36, '79, 1941, '56

Jesus: a/k/a Christ (the anointed one) 188 mentions
Jews: numerous mentions herein.

Jews: actions against and criticism of. 900 BC, 586 BC, 168 BC, 67, 70, 200, 321, '25, 400, '13, 538, '50, 624, '44, '83, 1096, 1146, '79, '82, 1215, '90, 1306, '47, 1421-2, 92-3, 15', '33, 1543, '60, 8, 1751, '59, '95, 1820s, '23, '30, '64, '83, 194

The Jews and Their Lies: Martin Luther. 1543

Jezebel: Phoenician wife of Ahab. AD 9

Jihad: struggle to spread Islam

Job, Book of : *Hebrew Bible*, The Hebrew Lord allowed an innocent and pious man, Job, to suffer to win a bet with Satan. The Lord did not explain to Job why he suffered. The Lord gave Job new children, 586 BC, 300 BC, 1620, 1879,

Johannes Scotus Eriugena (John: the Irish born Scot) a/k/a John the Scot, only Christian philosopher of note between Boethius (524) and Anselm (1076), wrote *The Division of Nature* in 862. 862

John 22: Pope's bul, *Spondent pariter* to squelch alchemists, but crippled real chemistry. 1317

John 23: one of three simultaneous popes in 1409

John 23: Pope. 1948, 1963

John Duns Scotus: separated dogma from science, enabling science to progress. 1290

John Paul 1: 1978, populist pope, likely murdered. 2013

John Paul 2: Pope, During his papacy, he officially made public apologies for over 100 Church wrongdoings, including: the persecution of Galileo, Catholics' involvement with slave trading African chiefs, the church's burnings at the stake and the religious wars, the historical denigration of women, the inactivity and silence of many Catholics during the Holocaust, for Catholic sex abuse cases, for the church backed "Stolen Generations" of Aboriginal children in Australia, the behavior of Catholic missionaries in China in colonial times. In 1988, he abandoned all rational arguments for God. He eliminated the Office of Devil's Advocate, making the process of canonization simpler. 1984, '88, '92, '96, '98, 2000

John, King of England: "Nobles forced him to sign the *Magna Carta*. It granted habeas corpus, trial by jury, and other rights to nobles, not to peasants, a small step towards democracy. 1215

John, Saint: *Gospel of John*. AD 30, 70, 255

Johnson, Lyndon Baines: U.S. president. 1964

Johnson, Samuel: *Dictionary of the English Language*, "The greatest part of mankind have no other reason for their opinions than that they are in fashion." "[Americans] are a race of convicts, and ought to be thankful for anything we allow them short of hanging." 1710, '55, 1925

Jones, John: US District Court judge, described the actions of the promoters of *Intelligent Design* as "breathtaking inanity," 2005

Jones, William: saw Sanskrit similar to Greek and Latin. So he deduced they had a common ancestor. 1786

Jordan, Ernst Pascual: German physicist, 1925

Josephus: Roman historian, In his *Antiquities of the Jews* (AD 94) mentioned "Christ." AD 77

Joshua: He ordered the Sun to stand still, 1543

Joule, James: thermodynamics. 1843, '50, '52
 Joule: a measure of energy. 1846
 J P Morgan and Co.: Large US bank. 1926, '29, '41
 Judea: area roughly present Israel. 586BC, 268BC
 Julian: a general under Constantine, expressed the *Small God Problem*. AD 363, 1795
 Julian: a married bishop of Eclanum, criticized Augustine's applying *original sin* to infants. 413
 Julian calendar: 50 BC: 1513, 1582
 Julius Gaius: successful Roman general, became Julius Caesar (means dictator): killed by Anthony and Brutus 44 BC. 65 BC, 50 BC, 44 BC
 Juliot, Frederic: and wife Irene (daughter of Marie Curie), bombarded elements with alpha particles (2 protons), and induced radiation in the elements. 1934
 Jung, Carl: psychiatrist. However far-fetched it may sound, experience shows that many neuroses are caused by the fact that people blind themselves to their religious promptings because of a childish passion for rational enlightenment." 1931, 2000
 Juno: Roman goddess of fertility
 Jupiter: planet. 150, 1610, '70, '76, 1968,
 Jupiter: principal Roman god, 449 BC
Just War principle: 400 BC, 413, 1273, 1509, 1945
 Justinian: Roman emperor. 529
Justinian Code: 538, 628, 1076, '88, 1500
 Abu Ubayd al-Juzani's *The Tarik al-Aflak*: 1070 pointed out the "quant" problem (irregularities in planets' orbits), in Ptolemy's concept of the universe. 1070

K

Kahneman, Daniel: *Prospect theory*. 1973, '75, '79-80, 2011, p.399
 Kames, Law Lord / Henry Home: Scot, leader of the *Scottish Enlightenment*, judge, philosopher. "We sit to enforce right." 1725, '34, '77
 Kant, Immanuel: Continental realism, German idealism, *Critique of Pure Reason* 1781, *Critique of Practical Reason (Categorical imperative)* 1788, *Critique of Judgment* 1790, *General and Natural Theory of Heavens* 1755. 387 BC, 335 BC-Aristotle, 300 BC, 1076, 1637, '87-Newton, 1734, '49, '55, '79, '81, '83, '85, '88, '90, '99, 1820s, '61, '80, 1916, '24, '36, '75
 Kaufman, Scott: psychologist, 200,000 BC
 Kelemen, Deborah: Children tend to think things happen because a person caused it. 2011
 Keller, Helen: "The economy is governed for the richest, for the corporations, the bankers, the land speculators, and the exploiters."
 Kellog, Vernon: 1914-19
 Kelvin of Largs: Lord / William Thomson, eminent Scottish physicist at U. Glasgow. Knighted In 1886.

Became Lord Kelvin in 1892. First scientist in House of Lords. See William Thomson, this Index
 Kelvin scale of temperature: degrees the same value as Celsius/Centigrade. Absolute zero is 0 degrees Kelvin, and minus 273.16 C
 Kennedy, John Fitzgerald: US president, "A nation that is afraid to let its people judge the truth and falsehood in the open market is a nation that is afraid of its people."
 Kepler, Johannes: *The New Astronomy* 1609, *On the Motions of the Planet Mars* 1609. Planets orbit the Sun in ellipses, close to circular. 1543, '77, 1600, '09, '13, '16, '33, '50, '57, '76, '84, '86-7, 1768, 1962. p. 418, 434, 437, 491
 Kepler Spacecraft: (2013), p. 437
 Kekulé, August: (1829 –1896), German organic chemist. A most prominent chemist in theoretical chemistry. He founded the theory of chemical structure and in particular in 1865 the structure of benzene.
 Keynes, John Maynard: *History of the General Theory of Employment and Money*. "The power of vested interests is vastly exaggerated compared to the gradual encroachment of ideas." "When my information changes, I alter my conclusions." "When the accumulation of wealth is no longer of high social importance, there will be great changes in the code of morals. We shall be able to rid ourselves of many of the pseudo-moral principles which have hag-ridden us for two hundred years, by which we have exalted some of the most distasteful of human qualities into the position of highest virtues." 1936
 Khadija: first wife of Mohammed. 610
 Ibn Khaldun: formulated a theory of the rise and fall of states, *Introduction to History*. 1377
 Umar ibn al-Khattab: second caliph, a powerful and humble man. By 642, conquered the rest of Arabia. 642
 al Khwarizmi, Mohammed bin Musa: algebra. 825,1085,
 Kierkegaard, Soren: Swede, existentialism. "Let us worship God in simplicity, instead of making a fool of him in splendid edifices. 1846
 Kilby, Jack, LASER, Light Amplification by stimulated Emission of Radiation. p. 433
 al Kindi, Yakub: chemist, rejected alchemy. c.865
 Kinetics: the science of motion.
 von Kleist, Georg: built a primitive battery, 424
King James Version of the Bible: most widely used English version of the *Bible*: used herein. 1611
 King, Martin Luther, Jr.: "Nothing in the world is more dangerous than a sincere ignorance and conscientious stupidity." 423
 Kipling, Rudyard: Brit, philosopher, writer, *Gunga Din*, *The Ladies*, *Kim*, *Barrack Room Ballads*, *The White*

Man's Burden, Tommy, The Jungle Book, “. 1847.

Kirchoff, Gustav and Robert Bunsen: in 1859 built a spectroscope, saw that elements radiate specific wave lengths. 1859, pp. 466, 475

Kirsch, Jonathan: Monotheistic religions. AD 96

Knight, Joseph: a slave in Jamaica whose owner took him to Scotland, sued for his freedom. Law Lord Kames, speaking for Scotland's Court of Sessions, freed him stating, “We sit here to enforce right, not to enforce wrong. . . Jamaican law being here unjust, could not be supported in Scotland.” 1777

Knowledge: 1. understanding information (Einstein), 2. justified true beliefs. It can be divided into different “cognitive fields,” such as physics, biology, botany, aeronautics, etc., more certain than beliefs, which most persons act on as if it were knowledge. *A priori* knowledge is knowledge that doesn't depend on experience, like math; a *posteriori* knowledge depends on experience. Francis Bacon, “The delight and pleasure of knowledge and learning far surpasses all other in nature.” p.1

Knowledge is power: a popular paraphrase of similar statements appearing first in the *Hebrew Book of Proverbs*, 24:5, then in 7th century by Persian, Imam Ali, Nahj al-Balagrain (599-661). Then in 1597 in Francis Bacon's *Meditations* “scientia potesta est” translated as “Knowledge is itself power.” referring explicitly to God's power. Then in 1668, Thomas Hobbes's 1668 edition of *Leviathan*, it said simply, “Knowledge is power.” Then In 1835, Ralph Waldo Emerson: “There is no knowledge which is not power”. Then In 1880, Edmund Burke in Parliament, “All wealth is power, so power must infallibly draw wealth to itself by some means or other.” (i.e., wealthy people cheat somehow.) Then in 2013, Paul Krugman got real, He said, “Knowledge is not power. Power is power.”

Knox, John: brought Calvinism to Scotland. It became Presbyterianism in the U S. 1560

von Koenigsburg, Johann Muller: astronomer, 1496

Koheleth: teacher / preacher, *Ecclesiastes*, 250 BC

Kohlrausch, Rudolph: electrolytic conductivity. 1839

Kohn, Hans: Nationalism dates from c.1750. 1750

Kopp's law: 1864, the heat capacity of a molecule is the sum of the heat capacities of its constituent elements

Koran / Qur'an: holy scripture of Muslims, reputedly dictated to Mohammed by the angel Gabriel. 1300 BC, 335 BC-Aristotle, 200, 610, 622, 642, 644, 732, 750, 865, 870, 932, 1000, '85, '96, 1150, 1250, 1300, 1440, '54, 1633, 1751, '85, 1940, '89, '98, 2013

Kowalska, Maria: her writings were first put in the

Index of Prohibited Writings, later she was made a saint, p. 416

von Kraft-Ebing, Richard: Baron, psychiatrist, 1886

Kramer, Henrich: Dominican monk, okay to torture people who just might be witches. 1484

Krauss, Lawrence: humanist, cosmologist, *A Universe from Nothing, Why There is Something Rather than Nothing*. 1980, 2012, pp. 418, 437

Krishna: Lord, Hindu god. 2000 BC

Kropotkin, Petr: Russian anarchist, “The struggle to exist usually leads to mutual aid rather than combat as the chief criterion of evolutionary success.” 1902

Kubla Khan: grandson of Genghis Khan. 1258, '71, '98

L

Labor theory of value: Theoretical value (selling price) of a commodity is determined by the quantity of labor needed to produce it. At the end of the 19th century this theory was superceded by a better theory, the marginal productivity theory of distribution which said many factors determine the value of a commodity. But In reality, all goods are sold simply at the highest price the seller can get, irrespective of any more objective factors.

Lactantius, Roman Christian historian. AD 313, 2012, p. 410

de Lafayette, Marie-Joseph Paul de Motier: Marquis French general in American Revolution and figure in The French Revolution 1776. '89

Lama: Buddhist monk or priest

Laissez faire: French for “Let it (business) go forward” (i.e., unimpeded by government regulation). 1776

de Lamarck, Jean Baptiste, Pierre Antoine de Monet: / Lamarckism, philosophe, His *Zoologique* proposed that offspring inherit traits acquired by their parents during their lifetimes. Darwin at first bought it, but later correctly discarded it. 1809, '59, '63, 1900

L'Amour, Louis: *The Walking Drum*, “It is a poor sort of man who is content to be spoon-fed knowledge that has been filtered through the canon of religious or political belief.

Lamont, Thomas, chief of J P Morgan and Co. Admirer and financier of Mussolini and fascism. 1926, 29

Land reform: theory based on the notion that land is not fairly distributed among men. Ralph Waldo Emerson said that “If a man owns land, the land owns him.” 1689, 1782, 1879

Landsteiner, Karl: discovered blood groups. 1901

Langmuir, Irving: covalent bonding, 1919, 1939

Lao-tzu: The Way, Tao is the energy of the universe. 350 BC

de Laplace, Pierre Simon: Marquis, one of the greatest scientists in history, astronomer, showed mathematically that planets orbit

according to Newton's laws of motion. 1624, '84, 1
1796, 1799, 1812, 1814, 1998, pp. 423, 435
Large Comprehensive, The: book on medicine by
Mohammed ibn Zakariya al-Razi. c.900
Large numbers, the law of: the fundamental principle of
statistics; the bigger the sample the more reliable
the data.
Larousse Dictionary: put on the *Index*. p.416
Last Supper: painting by Leonardo da Vinci. 1486, 1517
LaVey, Anton Szandor: Satanist, *Satanist Bible*.
When asked about his position as head of the
Church of Satan, said, "It's a living." 1986
de Lavoisier, Antoine: *Elementary Treatise on
Chemistry*. Advanced chemical research.
He said water was H₂O. 1783, '89, 1906, '62
de Lavoisier, Marie-Anne: wife of Antoine, assisted
him immensely, learned English to translate for
him. Illustrated his writings. 1789
Lawrence, D H: *Lady Chatterly's Lover*. p. 418
Laws of thought: basic. Aristotle, See Basic
laws of thought this index. 335 BC-Aristotle,
1160, 1748, '51, 1819, 1905
Layton, Geoff: *Access to History: Democracy and
Nazism: Germany 1918-45*, named 3 dominant Nazi
themes: The *Führer* cult. Hitler portrayed as a
messiah-type figure, 2. The *Volksge-mein-schaft*
(national community) to appeal to the people to
develop a unifying idea, nationalism to exploit the
discontent after their defeat in the Great War.
3. To make Germany great again. 1933
Lazarus, Emma: poem on Statue of Liberty. "Give
me your poor, your tired, your huddled masses
yearning to breath free . . ." 1886
Lazarus: reputed to have arisen from the dead. 1864
Leavitt, Henrietta: astronomer, devised a way to
determine distance to stars/galaxies far away.
(Hubble used her method.) 1916, 435
le Bon, Gustave: Crowds are more than the individuals.
The fate of a people depends on their character,
not intelligence. 1532, 1895, 1913
Lecky, William E H: There is no wild beast so ferocious
as Christians who differ concerning their faith. 1871
Van Leeuwenhoek, Antoine: Dutch, built a powerful but
extremely simple one-lens microscope with a lens of
a droplet of molten glass. He founded microbiology.
1600, '73
Legal positivism: positivism as applied to the law. Law
is simply the enforceable commands of
government; there are no religious or normative
values to validate it.
Legal realism. The law is what the judge says, no more,
no less.
von Leibniz, Gottfried: Baron, discovered calculus at the
same time as Newton, wrote *Essais de theodicee*,
1710, *Monadology* 1714, *The Principles of Nature
and Grace* based on Reason. 1714. Said, "Why is
there something rather than nothing?" 337, 413,
825, 1076, 1273, 1600, '37, '61, '86-7, 1700, '03, '10,
'14, '35-6, '51, '55, '58, '79, 1800, '08, 1912, '90
Lemaitre, Georges: priest, astronomer, said the universe
exploded from a single point, a singularity. He
called it the *Dynamic Evolving Model* of the
universe, which in 1950 became known as the *Big
Bang Model* of the universe. 1927, '29-30, '48, '50
Lenz, Heinrich: electricity theoretician. 1833, p. 426
Leo 3: ordered religious images/icons destroyed. 433
Leo 9: pope when the final split between Rome and
Constantinople occurred. 1054
Leo 10: Pope, Giovanni de Lorenzo de Medici, son of
Lorenzo the Magnificent, sold indulgences to build
St Peter's basilica. 1513, '15-6
Leo 12: Pope, made Jews wear special clothing to identify
them as Jews. 1823
Leo 13: Pope, *Aterni Patros testem benevolentiae*, equal
toleration of all religions. . . is the same thing as
atheism. 1878-9, '85, '91, '93, '95 '99
Lepton: an elementary particle. See Atom
Lettres philosophiques: Voltaire described the
English *Enlightenment* thought to Frenchmen. 1733
Leucippus: posited *atomic theory*, his pupil, Democritus,
furthered it. 450 BC, 430 BC, 335 BC. 1808
Levellers: British utopian group, John Lilburne. c.1643
Leviathan, by Thomas Hobbes, "Life in nature is
solitary, poore, nasty, brutish, and short." 1651
Levinson, Bernard: 1945
Lewis, C S: popular Christian author. Articulated the
"trilemma." 1940, 44, 47-8, 55, 60, 66, 81, 85-7,
2012, pp. 405-7
Lewis, Sinclair: eminent American social critic, "The
Christian Church today is either an apology
for no God or for God's mistakes." *Main Street*,
1920, *Babbitt* 1922
Lewis, Thomas: "If DNA didn't blunder slightly, we
would still be anaerobic bacteria."
Leyden jar: primitive battery, Musschenbroek. 1745
Libby, Willard: discovered carbon dating. c.1940
Liberty, On: John Stuart Mill. According to Mill, co-
author was his partner and wife, Harriet Taylor. It is
and has been a most influential book. 1859
Liberty, Will is wish and liberty is power. Voltaire.
Lichtenberg, Georg: 5000 BC, pp. 423, 444
Life: 3 universal indications of life: the need to take
in energy to maintain its integrity. The ability to
reproduce. The ability to respond to stimuli.
The most basic example of life is the cell.
Life and Spirit, Spinoza: *The, a/k/a The Three
Impostors*, a compendium of doubt. 1719
Life of Jesus: Ernest Renan, Jesus was a very good man,

- but not divine, very popular book. 1863
- Light: that portion of the electromagnetic spectrum visible to humans. Over 230 mentions herein.
- Light year: distance that light travels in one year, c5.88 trillion miles or c.9.3 trillion kilometers.
- Lilburne, John: Brit Utopian democrat, the Levelers 1646
- Lincean Academy*: Rome, a scientific society, honored Galileo for defending Copernicus. 1613
- Lincoln, Abraham: *Emancipation Proclamation* 1863, *Gettysburg Address*. 1863
- Lind, James: Scot, British Naval surgeon. Suggested citrus for scurvy. Adopted 40 years later. 1757
- Lindbergh, Charles: first to fly solo across the Atlantic, became an American hero. He admired Germany. He was the primary speaker for the *America First Committee*, a pro-fascist anti-Semitic organization. He changed after Germany declared war on the US 4 days after Pearl Harbor. In the 1950s he secretly had seven children with three German women, a secret he hid. One child discovered it and made it public in 2003. 1935-36, 40-41
- Linguistics: the scientific study of language.
- Linnaeus, Carlous / Carl von Linne: devised a system to classify plants and animals. 1735
- Linnean Society*: London. 1858
- Lippershey, Hans: first telescope. 1585, 1608
- Lippmann, Walter: influential American journalist, political theorist, 399 BC, 1937, pp. 399, 4
- Lisbon earthquake and tsunami: on All Saints Day, 1755, a major Catholic holy day, destroyed most of Lisbon, its most important churches, killed many Catholics. 1755, 1759
- Lister, Joseph: *On the Antiseptic Principle in the Practice of Surgery*, revolutionized surgery, 1867
- Liu Xin: Chinese astronomer, pi. 136 BC
- Livingston, Stanley: 1936-7
- Lobachevsky, Nickolai: non-Euclidian geometry in 1826. 1796, 1826, 1915
- Locke, John: Brit, influential political theorist, father of classical liberalism, "Wherever law ends, tyranny begins." *An Essay Concerning Toleration* 1689 and 1690, *Essay Concerning Human Understanding* 1690, *Two Treatises on Civil Government*, 1690, *The Reasonableness of Christianity* 1693, and concepts: *tabula rasa*, duty to revolt, and "life, liberty, and property" (Slaves were property). He advocated child labor, slavery, and other abhorrent social practice. p. 1, 1586, 1600, '24, '33, '87-90, '96, 1700, '24, '33, '39, '48, '51, '73, '76, '79, '81, 1896, 1922, '75
- Lockyer, Norman: discovered a dark line in Sun's spectrum indicated an element not then known, he named it helium; later it was found on Earth. p. 474
- Logic: technique of reasoning explained by Aristotle using basic laws of thought to reach a conclusion to achieve coherence in statements about the natural world. Deductive logic uses two or more presumptively truthful premises to reach a presumptively true conclusion. Inductive logic uses two or more premises, at least one of which is not presumptively true but purportedly reasonable to reach a conclusion whose truth is not certain but depends on the strength of the premises, fully analyzed in Aristotle's *Organon*. 335 BC
- Logical fallacies: logical errors in argument. 335 BC-Aristotle, 1687-Newton, 1779, 1929, 55, 65 examples on p. 443
- Logical positivism*: a philosophical movement that began in Vienna in the 1920s and guided philosophy of science for thirty years. It faded in the 1960s. the view that philosophy should be based on observation and testing and that statements are only meaningful if they can be verified, 1930-Compte, 1912-Whitehead, 1922-Wittgenstein, 1936-A J Ayer
- Lokayata: ancient Indian materialistic doctrine, its adherents were the Carvaka. 620 BC, 600 BC
- Long, Huey: Southern politician, 1945
- Lorentz, Edward: meteorologist. 1961
- Lorentz, Hendrik Anton: Einstein said his own theories of relativity were based on Lorentz's and Mach's work. 1886, '92, '95, 1905-6, pp. 429, 430
- Lorentz Force Law*: The force on a charged particle moving in electric and magnetic fields, equals the particle's charge times the sum of the electric field and the cross product of the particle's velocity with the magnetic flux density. p. 429
- Lorenz, Ludvig: Danish physicist. P.4281867
- Lorini, Niccolo: friar, criticized Galileo. 1613
- Louis 14: French "Sun King," ruled 72 years. D'etat, c'est moi." 1650, '85
- Louis 15: French king. 1770, '33, '51, '80
- Louis 16: French king, beheaded. 1793
- Luce, Claire Booth: US journalist. "50 years [Freud] spends analyzing women. And he can't find out what they want. So [he's great?]
- Luce, Henry: powerful US press lord, publicly admired fascists, particularly Mussolini, until Germany declared war on the US. He promoted the *Red Scare* during the Cold War, 1923, '24, '28-29, '35-36, '41m '54
- Lucian of Samasota: (c AD 120-190), a Roman satirist and atheist, Christians, Cynics, Stoics, and the Olympian gods.
- Lucius 3: Pope, *Ad abolendam*, Holy Inquisition. 1184
- Lucretius, Titus Carus: atheist, atomist, *On the Nature of Things*. 58 BC, 1431, '73, 1532, '80, 182, 1859, p. 452
- Luke: Saint, *gospel of*. first century AD 1300 BC,

AD 30, AD 40, AD 70, AD 177, AD 200
 Luthardt, Christoph Ernst, anti-Darwin. 1860
 Luther, Martin, Lutheranism / Lutheran. Luther started the Protestant Revolt / Reformation, *Disputation on the Power and Effect of Indulgences (a/k/a The 95 Theses)* 1517, *On the Jews and Their Lies To the Christian Nobility of the German Nation, Against the Robbing and Murdering Hordes of Peasants, Against the Roman Papacy, an Institutiofrthe Devil. He was an extreme anti-Semite and quoted by Nazis at the 1946 Nuremburg War Crimes trial to justify killing Jews in the Holocaust.* 1095, 1376, 1516-7, '19, '25, '27, '36, '43, '46, 1555, 1689, 1748, 1850, 1946, '73
 Lyell, Charles: Brit, prominent geologist, *Principles of Geology* 1830-3, *Geological Evidences of the Antiquity of Man* 1863. 1830-2, 1858-9, '63, '71
 Lyengar, Shanto, and Sean Westwood: Prejudice based on political ideology is greater than racial or gender prejudice. 2016, p. 407

M

M-theory: Stephen Hawking and Leonard Mlodinow's candidate for the "theory of everything." 2010
 Macaulay, Thomas: Lord, statesman, philosopher. 1765, 1835
Macbeth, "Tomorrow and tomorrow and tomorrow, creeps in this petty pace from day to day. To the last syllable of recorded time, and all our yesterdays have lighted fools the way to dusty death. Out, out, brief candle! Life's but a walking shadow; a poor player that struts and frets his hour upon the stage and then is heard no more; it is a tale told by an idiot; full of sound and fury, signifying nothing."
 Mach, Ernst: Austrian, The laws of Newton's mechanics work only if events are referenced to certain special frames of reference. (Needs a starting point). 1886. 1905
 Machiavelli, Nicolas: a realist, not a theorist, regarding politics, *Realpolitik, The Prince, History of Florence.* 1473, 1532, 1649, 1883
Machina mundi: concept that the world is one giant materialistic machine. 1687
 Mackay, Charles: *Extraordinary Popular Delusions and The Madness of Crowds* (1841). 1212
 Mackie, J L: On the *Free Will* Defense, "If an omnipotent God existed, He could have made beings who would act freely but always do right." 1955
 Machine(s). 300 BC, 50, 1486, 1637, 1687, 1747, 1776, 1795, 1894, 1956
Madame Bovary: 1848, Gustave Flaubert. 1847
 Madison, James: revolutionary, deist. Author of some of the *Federalist Papers, U S Bill of Rights* 1789. 1624, 1779, '89

Maeterlinck, Maurice: p. 418
 Magdalenian man: Modern man. 18K BC
Magic of Demons, On the: Johann Meyer. 1563
Magna Carta: (in Latin), King John forced to cede some power to nobles, not commoners. 1215
 Magnet: a body which produces a magnetic field. All magnets are Di-pole and follow the rule that like poles repel and unlike poles attract. Thales had a magnetic rock found near Magnesia in Anatolia. Magnetism can be electromagnetic.
de Magnete: William Gilbert, Earth is a magnet. 1600
 Magnetic: 1546, 1600, 44, 1831, '61, '99, 1973, 2017 and numerous entries in the *Electromagnetism Timeline*. pp. 424-433
 Magnetism: the characteristic property of a magnet .
 Magnetic field: the field of force that surrounds a magnet.
 Magon, Ricardo Flores: Mexican revolutionary: "Clergy . . . the hydra which guards . . . this prison called Earth." c.1911, 1890
 Mahavira: founded Jainism (self-discipline) c510BC
 Mahmud: Turkish Ottoman reformer. 1839
 Maiers: Pauline, 100 *Declarations of Independence*, 1776
 Maimonides, Moses: Spanish-Egyptian rabbi, most important Jew since Moses, *Guide for the Perplexed*, 1190, 1217, 1273, 1305, 1670, pp. 422, 472
Main Street: Sinclair Lewis. 1920
 de Maillet, Beloit, evolutionist, 1859
 de Maistre, Joseph-Marie: Compté, traditionalist. 1796
 Male superiority / women inferior: is the oldest and deepest ingrained prejudice in the world. It is ingrained in most of the world's cultures. c5000-4000 BC Hinduism, c.1775 BC-Hinduism, 1500-1400 BC-Bible, 594 BC-Athens, 430 BC-Code of Manu, 399 BC-male citizens, 335-323 BC-Aristotle errors, 200 BC - Cato, CAD 49-c60-Bible, AD 415-426- Augustine, 650-Mohammad, 675-Toledo, 1273- Aquinas, 1405-Christine, 1524-Martin Luther, 1523, 24, 1525-Luther, 1562-John Knox, 1620-Puritans, 1625- Grotius, 1670-Spinoza, 1674-John Locke, 1764-Rousseau, 1765-law, 1776-John Adams, 780-Bentham, 1781-Kant, 1781-NW Europe, 1787 and 1789- *US Constitution*, 1792 & 1811-Jefferson, 1799-Napoleon, 1848-Cambridge, 1875-Susan Anthony, 1882-Neitzsche, 1938-Hitler-a master race, 1968-Catholics, 1970s-Vera Rubin, 1978-Mormonism, 1990s-Southern Baptists, 1994 & 1998-John Paul 2, 2021-Orthodox Judaism
Women treated as equal, See also "Women", this Index. 7500-5600 BC, 1300 BC, 545 49 BC-Pythagoras, 490 BC-Sparta, 375 BC- Plato, 1198-Averroes, 1516-Thomas More, 1620- Puritans, 1647-Quakers, 1678-Bunyan 1748- Montesquieu, 1775-

Thomas Paine, 1792- Gouges-Wollstonecraft, 1795-
 Concordet, 1825- Gandhi, 1847-Ibsen, 1848-Karl Marx,
 1848- Stanton, 1865-John Stuart Mill, 1870-Ingersoll,
 1920-US women vote, 1924-Emma Goodman, 1971-
 Swiss women vote, 1980-Howard Zinn, 2012-Pinker,

Malebranche, Nicolas: French priest, posited
Occasionalism: There is only one true cause,
 God. If one strikes a match, God causes the
 match to light. increases. 300 BC, 1644, 1688
 1798, 1817, '38, '55, '59,

Malpighi: Italian, discovered capillaries, making the link
 between veins and arteries that Gilbert said should be
 there. 1666

Malthus, Robert Thomas: Anglican priest, population
 increases faster than food supply. So, always a
 struggle for food. BC, 1798, 1817, '38, '55, '59

Man is the measure of all things, Protagoras. c.450 BC
 (Socrates: "That's vain.")

Man: mankind, humans, *Homo sapiens*, people,
 persons, human beings. "Man," depending on the
 context, refers to all mankind or an adult male.
 Shakespeare, "What a piece of work is man! How
 noble in reason! How infinite in faculty! . . .the
 paragon of animals.

Man's Place in Nature: Thomas Huxley. 1860

Mandeville, Bernard: Dutch / English. 1709

Mani / Manichaeism: two gods, good and evil, in
 conflict. c620 BC, 274, 1048

Manitou: the spiritual and fundamental life force
 understood by Algonquian groups of Native
 Americans. It is omnipresent and manifests
 everywhere: organisms, the environment, events.

Mann, Thomas: Tolerance becomes a crime when
 applied to evil. (Considered a criticism of God's
 inaction in the face of evil or suffering.)

Manu: Hindu progenitor of Man. *The Code of Manu*.
inter alia, men own women. c.400 BC

Manutius, Aldus: Venetian printer, scholar. 1514

Mao Tse Tung: led China, the largest country in the
 world, to communism. 1928, 63,

Marat, Jean Paul: "God has always been hard on the
 poor."

Mariani, Piero: 2000

Marcion: Roman Christian Jew, founded Marcionism,
 said the harsh Hebrew scriptures were inconsistent
 with Jesus's peaceful teachings, so discard them.
 This was not adopted. c AD 150, 200, 321

Marconi, Guglielmo: wireless radio 1895 p. 431

Marcuse, Herber: "It is not the idea of God that has
 that has been an obstacle to human liberation,
 but the use that has been made of the idea of
 God."1968

Marduk: Sumerian god. c2000 BC

Maring, Luke: philosopher, "God, as an authority figure,
 has a duty to prevent suffering." 2012

Marlowe, Christopher: *Tragical History of Dr. Faustus*:
The Jew of Malta. 1633: Mars: planet: AD 150: 1609:
 56: '72: 1968: '73

Mars: Roman god of war. 753 BC

Marshall, George: US general and secretary of
 state, 1948

Marshall Plan: Truman's plan to restart Western
 European economies after WW 2. 1948

Marshall, Thurgood: US Supreme Court . 1964

Marsiglio of Padua: advocated unsuccessfully that the
 Church act democratically. 1324, '31, 1776

Martel, Charles: king of the Franks. 732, 753

Martin 5: pope. 1414

Marx, Karl: and Frederick Engel wrote the *Communist
 Manifesto* 1848, *Das Kapital* 1867. 1820s, '48, '59,
 '67, '81, 1975

Mary, mother of Jesus: AD 70, AD 475-6, 787, 1517

Mary, Queen, wife of William of Orange: 1688

Mary, daughter of Henry 8 by Catherine 1: became
 Queen, killed many, so called Bloody Mary. 1533

Mason, George: *Virginia Declaration of Rights* 1776. He
 proposed a *Bill of Rights* to the Constitutional
 Convention for the *US Constitution* in 1787. The
 delegates rejected it. 1776, '87, '89

Maspero, Gaspon: the *Pyramid Texts* 1881

Mass, Physics: quantity of matter in an object, different
 from object's weight. 590 BC, 500 BC, 440 BC, 1020,
 1572, 1666, '87-Newton, 1710, '14, '35, '39, '45, '55,
 '83, 1803, '20s, '46, '50, '86, '96, 1900, '05, '07, '09, '15,
 '27, '32-3, '39, '70s, '74-5, '98, 2004

Mass, Christian religious service: missing Mass is a
 Mortal Sin (ticket to Hell unless forgiven) for
 Catholics to miss mass. 1054, 1150, 1517, '45, 1687,
 1759

Mass-energy: Einstein, mass and energy are different
 forms of the one substance, mass-energy. 1687-
 Newton, 1714, 1783, 1905, 2000, 2006, 2009

Mass, of people: p.1, 600 BC, 509 BC, 399 BC, 65 BC,
 AD 410, 910, 1150, 1190, 1532, 1600, '70, 1787, '93, '95,
 1808, '48, '82, '86, 1925, '47

Massachusetts: 1607, 41, '70, 1739, '65

ibn al Mas'udi: astronomer, geographer. 910

Materialism, view that physical matter is the only reality
 and that mental processes may be explained in terms
 of that physical reality. It denies the existence of a
 "mind" as an entity separate from the body. 430 BC,
 425 BC, 1651, 1848, '81, 2000

Mathematics: a tautological science of the relationships
 among amounts (of numbers, distances, things,
 apples, dollars, velocities). 163 references herein

Matrix Mechanics: a formulation of quantum mechanics
 that does not involve a wave function. Werner
 Heisenberg. 1927

Martyr, Justin: AD 125

Matter has three forms, solid, liquid and gas. Much matter can exist in more than one form, even iron.

Matthew, Gospel of: 1300 BC, AD 30, 45, 178, 200, 1830

Maugham, Somerset: "I cannot believe in a God that has neither honor nor common sense." 1938

Mauryan dynasty: India. 325 BC

de Maupassant, Guy: We see things only with the memory of what our predecessors thought about what we see 1880: pp. 398: 465

Maximillian: H R emperor, OK'ed burning *the Talmud* 1515

Maxwell's Equations: James Clerk-Maxwell, the fundamentals of electromagnetism, 1519, 1638, 1812, '55, '59, '61-2, pp. 427, 429-33, 437

Mayan civilization: 6000 BC, 2000 BC, 1046 BC, AD 200, 250, c776,

von Mayer, Julius Robert: *Conservation of Energy*. 1841,

McMullin, Ernan: *Anthropic Principle*, "WAP is a tautology." 1973

McNeill, William: His book, *The Rise of the West*, was the winner of the 1964 National Book Award in History and Biography. It had a major impact on historical theory by emphasizing cultural fusions, in contrast to Oswald Spengler's view of discrete, independent civilizations. 9000 BC, AD 96, 650, 815, 1500. p. 443

Mead, Margaret: anthropologist, student of Franz Boas, *Coming of Age in Samoa*. "Romantic love is a human construct." 1970

Meaning / purpose for human life: 530 BC-Tu Wei Ming, 510 BC-Mahavira, 387 BC Plato, 350 BC Lao-Tzu, AD 45-64-Paul, 425 BC-Socrates, 413- 26 - Ambrose, 650-Mohammed, 1750- Nationalism, 1863-Baha'u'llah, 1882-Nietzsche, 1922- Wittgenstein, 1931-Freud, 1931-Jung 1943-Campbell, 1955-Camus, 2011-Keleman, 2015-Schermer, p. 398, Freud-Goethe-Campbell- Chris Hedges- Bronowski, p. 417-Hitchens, p. 421-Seneca

Mechanics: a branch of physics. The study of the interrelations of force, matter, and motion.

Mechanism: the doctrine that all events and all thoughts occur according to the laws of mechanics.

d'Medici family: bankers, popes, cardinals, and leading citizens of Florence. 1397, 1450, '53, 1657

d'Medici, Catherine: mother of French king Henry 4. 1572

d'Medici, Cosimo, Grand Duke, ruler of Florence. 1450

d'Medici, Cosimo 2: Grand Duke, ruler of Florence. 1611

d'Medici, Giovanni: son of Lorenzo the Magnificent, cardinal at age 13, became Pope Leo 10. 1484

d'Medici, Leopoldo: a layman, Alexander 7 made him a cardinal to weaken his scientific academy. 1657

d'Medici, Lorenzo: the Magnificent. Ruled Florence, father of Pope Leo 10. 1532

Medicine / medicinal: 700K BC-medicinal plants, 20K BC-medicinal plants, 3200 BC-Egyptians, 400 BC-Hippocrates, 250-medicinal plants, AD 83-medicinal plants, 550-Dark Ages, 722-Muslims, 789-Capella, 1000-Avicenna, c.1060-China, c.1147-Muslims, 1242-Muslims, 1217-Dominicans, 1455-European, 1513-Copernicus, 1519-Amerindians, 1527-Paracelsus, 1596-Chinese, 1628-blood, 1757-scurvy, 1796-smallpox, 1831-Darwin, 1854-cholera, 1862-Pasteur

Meider, Wolfgang: Proverbs contain the value system of the time of their origin. [So can become outdated]

Mein Kampf / My Struggle: 1925-Adolf Hitler's manifesto. 1924-25, '33, '66, '75, 2015, p. 400

Meir, Golda: PM of Israel. (1898-1978) To a cabinet minister, "Don't be so humble. You're not that great." "There's no difference between one's killing and making decisions that will send others to kill. It's exactly the same thing, or even worse."

Melville, Herman: "My kingdom is as wide as the universe . . . I go forward always, freeing spirits and weighing worlds, without fear, without compassion, without love, without God. I am called Science." 1848. *Moby Dick/The Whale* 1847

Meme: a unit of culture transmitted from person to person. Concept started by Richard Dawkins. 1976

Memetics: the study of memes and their transmission. The key question is not how they benefit the group, but how they benefit their own propagation

Mencken, H L: Acerbic American social critic. "Where are the graves of Huitzilopochtli, Wotan, Moccus, Tezcatlipoca. Quetzalcoatl, Xiuhtecuhtli, Centeotl, Tlazolteotl, Mictlan, Xipe, Tzitzimitl, Tarves, Epona, Mullo, Damona, Esus, Drunemeton, Ra, Silvana, Dervones, Adsullata, Deva, Bellisima, Uxellimus, Borvo, Grannos, Mogons. Sutekh, Resheph, Anath, Ashtoreth, Nergal, Nebo, Ninib, Melek, Ahijah, Isis, Ptah, Anubis, Baal, Astarte, Hadad, Addu, Shalem, Dagon, Sharaab, Yau, Amon-Re, Osiris, Sebek, Molech, Thor, Bilé, Ler, Arianrhod, Morrigu, Govannon, Gunfled, Sökk-mimi, Nemetona, Dagda, Robigus, Pluto, Meditrina, and Vesta? These were gods of the highest standing and dignity-gods of civilized peoples-worshiped and believed in by millions. All were omnipotent, omniscient and immortal 300 BC, 1765, 1896, 1925,

Mendel, Gregor: monk, father of genetics. *Versuche über Pflanzenhybriden / Experiments on Plant Hybridization*, 1808, '65, 1900, '32, p.419

Mendeleev, Dimitri: Russian, devised *Periodic Table of Elements* arranged by atomic weight, 1869; in 1914,

corrected to use atomic number. 1973

Mendelssohn, Moses: German Jewish philosopher, reformer, 19th century, argued that the *Hebrew Bible* mainly orders only actions or non-actions, not beliefs; thus Jews could be secular. 1783

Menes: pharaoh, unified Egypt. c.3400 BC

Meng-tzu / Mencius: Confucian scholar. 340 BC

Mercantilism: political economic theory that a state should protect and promote national wealth by encouraging exports and limiting imports.

Mercator, Gerardus: Flemish map maker. 1546

Mersenne, Marin: French friar, disseminated scientific knowledge. 1623, '35, '70

Meslar, Sean: 2014

Meslier, Jean: French Catholic priest, wrote but he didn't reveal or publish a comprehensive exposition of atheism. It was found after his death. 1729, '51

Messier, Charles: published a catalog of comets and fuzzy areas in the heavens. 1774, 1912, '24

Metaphysical / Metaphysics: 1. The science of things transcending what is physical or natural. 2. the study of being as being, speculation about the meaning of what is. 3. the study of first principles and first causes. 4. the rational knowledge of those realities that go beyond us. 5. the inquiry into the ultimate and fundamental reality. Roger Shattuck says, "Metaphysics is such a word that can mean what wants it to mean, hence, its continuing popularity. To Aristotle it meant the field of speculation that he took up after physics." 504 BC, 425 BC-Socrates, 387 BC-Plato, 335 BC-Aristotle, 300 BC-Epicurus, c.910-al-Razi, c.1000-Avicenna, 1273-Aquinas, 1331-Ockham, 1624-Herbert, 1637-Descartes, 1651-Hobbes, 1657-Vatican, 1670-Spinoza, 1739-Hume, 1755-Kant, 1820s-Hegel, 1830-Compte, 1912-Whitehead, 1922-Russell, 1936-Ayer, 1950-Pius 12

Meteorite: any part of a meteor that hits the Earth. John W. Campbell, "Meteorites don't fall on the Earth. They fall toward the Sun and the Earth gets in the way." 6000 BC, 1100 BC, 450 BC, AD 196

von Metternich: Count, Austrian, dominated the *Council of Vienna*. 1815

La Mettrie, J O: *philosophe*, Belief in God is as groundless as it is useless. The world will never be happy until atheism is universal. 1748

Meucci, Antonio: telephone. 1871, p. 429

Michel 1: Patriarch in Constantinople. c.1054

Michener, James: author: humanist. "society has artists to remind itself of the finer things in life." AD 96: 1718, p. 416

Michelangelo Buonarriti: towering intellect, *inter alia*, painted the Sistine Chapel. 148, 1512

Michell, John: Brit clergyman, in 1783 posited black holes existed. 1783, 1796, 1916, pp. 434-5

Michelson, Albert, and E W Morley: Brits, calculated the speed of light. 1879

Microbiology: founded by van Leeuwenhoek with his secret microscope. 1673

Micrographia: Robert Hooke, physicist. 1665

Microscope. 1020, 1267, 1595-invented, 1660-1, 1670, 1673-van Leeuwenhoek, 1687-Newton, 1953-DNA

Miles, Theodore: *Miles's Theorem*, "The weaker the case, the longer the brief."

Milgrom, Morchadei: said a modified value for the strength of gravity obviated the need for the existence of dark matter. 1982, '98

Milky Way: a galaxy of c.100B stars including our Sun. Only stars in the *Milky Way* are visible to the naked eye. The closest galaxy beyond the *Milky Way* is the *Andromeda* galaxy. It is visible as a cloud to the naked eye. 600 BC-Thales, 335 BC-Aristotle, 1000-Biruni, 1610-Galileo, 1785-Herschel, 1917-Slipher, 1920-Curtis, 1924-Hubble, 1968-Sagan, 1973-Anthropic, 1992-Hawking, 2004-Andromeda

Mill, James, philosopher, father of John Stuart Mill

Mill, John Stuart: *A Study of Logic* 1843, 1851-*On the Enfranchisement of Women*, 1859-*On Liberty*, 1863-*Utilitarianism*, 1865, 1859-*On the Subjugation of Women*, According to Mill, their co-author was his partner and wife, Harriet Taylor. "Judging by common sense" is merely another name for 'judging by first appearance', 1869, 1874-*Theism*, 1952, 1751, '69, '89, 1830, '36, 2012

Miller, Hugh: *Footprints of the Creator*, Does the soul evolve? 1846

Miller, Stanley: physicist, recreated Earth's ancient atmosphere, amino acids appeared. 1952

Millikan, Robert: physicist, Nobel prize. 1931

Milton, John: poet. *Paradise Lost*. 1667, p. 416

Mind, the mind-body problem. The human mind, the functional and subjective aspect of the living brain. Two as yet unresolved schools of thought are whether the mind (*les cognitans*) and body (*les extensa*) are one (monism/ mechanistic materialism which assumes that the mind can be understood by the same processes that understand the ear, the eye, and so forth), or whether the mind is distinct from the body (dualism, like Cartesian dualism). Numerous references herein. See Descartes, 1637, and Elisabeth, Princess of Bohemia, 1643

Ming Dynasty: (1368-1644). 1500

Miracle: something done by a deity that violates natural laws. Basava Premanand, an Indian, spent a lifetime looking for "miracles" among the phoney gurus and godmen in India and never found one of their "miracles" that he couldn't duplicate using simple tricks. In Catholicism, a saint-candidate

must be found to have caused a miracle. Hume: "Upon the whole. . . no testimony for any kind of miracle has ever amounted to a probability, much less a proof." 900 BC, 425 BC-Diagoras, AD 40, AD 200, 401, 1046, '85, 1735, '48, '79, 1808, '63, 1947, '73, '83, '97-8, 2013

Miracles, Argument from: Only a god can perform a miracle. Jesus did, so he's a God. AD 45,

Mirandola, Giovanni Pico della: *Dignity of Man*. 1486, p. 416- the *Index*.

Misanthrope, La Tartouffe, 1664, and *Le Bourgeois Gentilhomme*: Moliere, satirized hypocrites. 1670- *Les Miserables*, 1862, Victor Hugo. 1847

Mitchell, Walter: Rev., anti-Darwin. 1860

Mitchum, Robert: "Kid, life's hard. But it's much harder if you're stupid." 1751

Mithra / Mithraism: sect of the Persian god Mithra, god of light, represented the power of goodness. 2400 BC, 620 BC, 300 BC, AD 30, 150, 200

Mivart, George: introduced the concept of irreducible complexity to refute natural selection. 1871

Mlodinow, Leonard: cosmologist, with Stephen Hawking, proponent of *M-theory* to explain the origin of the universe. 2010

Moby Dick/The Whale: 1851, Herman Melville 1847

Modest Proposal, A: Jonathan Swift. 1726

Mohammed / Ubu'l Kassim, founder of Islam, *Qur'an*, *Hadith*. 1300 BC, AD 200, 610, 622, '24, '30, '44, 923, 946, 1517, 1717, '48, 1835, 1989

Mohammed ibn al-Wahhab: founded an extreme authoritarian Muslim sect, Wahhabism. 1740

Molecule, two or more atoms bonded together. It is the smallest part of a substance that has the chemical properties of the whole substance. Occasionally two atoms of the same element will bond into a molecule. An oxygen molecule of two oxygen atoms has different qualities than two separate oxygen atoms next to each other. Same for an oxygen molecule of three oxygen atoms bonded together is ozone. 1738, 1824, '47, '59, '60, '77, 1900, '05, '13, '53, '64

Moliere, Jean Baptiste: *The Misanthrope*. 1664.

Momentum or M: It is the quantity of motion of a moving body. There are two kinds, linear momentum and angular (rotating) momentum. Linear momentum is mass times velocity. As velocity is speed in a specific direction, momentum also implies a specific direction. Momentum is thus a subset of inertia, which is the tendency of a mass to continue what it is doing, moving or standing still, until some force acts on it. An object resting on the ground is stationary relative to the Earth. If it were on the equator, because the Earth revolves completely every 24 hours, moves Eastward c24,000 miles (circumference of Earth) each day, or c.1000 mph (c24,000 miles divided by 24 hours) relative to the center of the Earth. See also angular/rotational momentum c.1000, 1664, '70, '87-Newton, 1736, 1927

Mona Lisa: Leonardo da Vinci, 1486

Monad: 1. An ultimate unit of being. 2. Applied to the deity. Used chiefly with reference to the philosophy of Leibniz, according to which the universe of existence consists of entities without parts, extension, or figure, and possessing, in infinitely varied degrees, the power of perception

Monadology: von Leibniz. 1714 Don't confuse with *Monadologia physica*, by Kant . 1756

Monism: any view claiming to find unity in a certain sphere where it might not have been expected.

Monod, Jacques, French biologist. 1600

Monotheism: doctrine that there is only one God. p. 1, c.1360 BC, AD 150, AD 230, 1800

Montagu, Lady Mary Wortley: crucial in introducing vaccine for smallpox to be developed. Had an active social life. 1721

Montague, C F: War hath no fury like a non-combatant

de Montaigne, Michel, Eyquem: essayist, *Of Wisdom, Essays, The Defense of Raymond Seybond, Autobiography*, What do I know? 1473, 1580, 1601

Montanari, Geminiano: in 1656 discovered a variable star. p. 434

de Montesquieu: Baron, 1748 *Spirit of the Law*. 1700, 21, '48, '51, '76

Montezuma: Aztec king, murdered by Cortez. 1519

Montgolfier, Joseph and Jacques: powered hot air balloon. 1783

Mooney, Chris and Sheril Kirschenbaum: 2011

Moonkin, Seth: science writer, 2011

More, Thomas: Lord Chancellor, Catholic, *Utopia*, murdered by Henry 8. 1509, '16, '33

Moreland, J. P: *Argument from Consciousness*. 1975

Morgan, J P. King of the robber barons. 1861, 1911

Morganstern, Oscar: with John von Newman, posited *Utility Theorem*. 1944

Morley: E W: and Albert Michelson: calculated speed of light. 1879

Morley, John: "All religions die of one disease, that of being found out." "The most frightful idea that has ever corroded human nature- [is] the idea of eternal punishment. 1874

Mormon / Mormonism: religion founded by Joseph Smith, then led by Brigham Young to Utah. 1630, 1633, 1827, '30, '90, 1978

Morse, Samuel F B: in 1837 patented a telegraph device. p. 427

Morse, Wayne: intelligent senator, 1952

Morton, William T G: successfully demonstrated ether as an anesthesia for surgery, an important medical discovery. 1846

Moses: greatest Jew, led Jews from Egypt, received *the Ten Comandments*. 1300 BC, 586 BC, AD 274, 321, 622, 1160, 1517, 1670, 1719, '48, 1864-5,

Mo-Tzu: studied inertia, 450 BC

Motion, generally (see also momentum above).

'540 BC, 450 BC, 435 BC, 430 BC, 335 BC Aristotle, 58 B C, 628, 825, c.850, c.1000-Biruni, 1020, 1273, 1536, 1590-Galileo, 1609-Kepler, 1620-Galileo, 1624, 1632-3, 1661, 1664, 1684, 1686-7, 1729, 1734, 1738, 1761-d'Holbach, 1799-Laplace, 1812, 1860, 1885-Mach, 1892, 1905-Einstein, 1907, '15- Einstein.

Motion, laws of: Newton's, three laws that enable one to predict the path of any object from a grain of sand to a galaxy. 1st law. Inertia, A body will remain at rest or in motion with a constant velocity unless acted upon by an outside force.

2nd law. Acceleration. The change in velocity of a body is proportional to the applied force.

This is expressed by Force = mass × acceleration / deceleration. 3rd law. Reaction. For every action there is an equal and opposite reaction. 1590, 1612, '64, 1666-Hooke, '84, '87, 1907

Motion, Brownian: 1886, 1905,

Motion, re relativity: (see discussion on momentum above) 1886-Mach, 1879, 1905, '07, '15-Einstein,

Motion, On/ De Motu: 1590, unpublished work by Galileo. 1684. (also title of a work by Berkeley

Motion, wave: see Huygens, p. 477

Motion of Earth through space: isn't measurable until a particular reference point is agreed upon.

The Sun is a logical reference point, 1879

Mott, Lucretia: a Quaker, famous speaker, 1848

Mo-tzu: Chinese philosopher. 450 BC, 1687

Mozart, Wolfgang Amadeus: Austrian, prolific genius, composer, *Don Juan*, died at 35, penniless. 1787

Mueller, Herbert: 1959

Mueller, Johann: astronomer, *Epitome*. 1464

Muhammad: see Mohammed (both are acceptable)

Mukhanov, Viachestav and G V Chibisov: cosmologists, Quantum fluctuations could lead to large structures in space. 1981

Muller, HJ: American geneticist, Nobel laureate. 1959

Multimodal theory of intelligence: Intelligence is made up of several different mental abilities, as opposed to the theory of one basic measure of mental ability "G," which tends to measure the average of specific mental abilities.

Muslim: See Islam, this Index

van Musschenbroek, Pieter: Leyden jar. 1745

Mutual Assured Destruction ("MAD"), balance of terror.

Relating to nuclear bombs. Doctrine that no state will use a nuclear bomb on another nuclear power as the other would retaliate and both would then be destroyed. It assumes the possessors of nuclear

bombs will act rationally. The theory became well known during the cold war when Russia developed nuclear bombs.

Neither the US or the Soviet Union attacked.

Mutation theory: Hugo de Vries, New species, new forms of living things can occur due to randomly occurring genetic mutations, which may create new species or new characteristics in an organism that then survives or dies due to its relative fitness to survive, i.e., natural selection. 1900

Myth: 1. stories about the origin or characteristics of nations, tribes, persons, or other groups, 2. a false belief. James Feibleman, "A myth is a religion no one any longer believes." Historically, myths served to justify and sustain a culture's particular social system and to validate prevailing social patterns, to provide rules and acceptable models for living, to supply divine sanctions for the prevailing culture and to show that the laws and customs of that culture were superior to other cultures.

N

ibn al-Nafis: examined and described the heart. 1242

Nahmanides: Universe may be expanding. 1250 in the astronomy timeline.

Naive literalism: Augustine's phrase to denote believing that the *Bible* means what it plainly says. 410

Names of God The: by Pseudo-Dionysus. c.500

Nanak Dev: guru, founded Sikhism. c.1499

Napier, John: (1550-1617), Scot, invented logarithms In 1614 to quickly do tedious multiplications and long division. Napoleon Bonaparte: see Bonaparte.

Naskar, Abhijit: (1991-) India-born, neuroscientist and philosopher. Genius. "Common people tend to term any kind of bizarre phenomenon as "paranormal" or "supernatural". They often exaggerate it as the work of the Gods. This belief is nothing but primitive ignorance. Social progress means that people must (a necessity, not a luxury) align their beliefs and behavior to new knowledge and understanding of nature." *Principia Humanitas* The human has not one but two births – first, when a person is born from the mother's womb, and second, when that person rises from the socio-culturally imposed cocoon of prejudices and ignorance." . "Mysticism and supernaturalism are the descendants of ignorance and fear."

"Every single phenomenon in the world, has a physical explanation underneath it. Finding the explanation depends on how far you go.

"Knowledge shall set the mind free."(ref. "Ye shall know the truth and the truth shall make you free. (John 8:32)

In *The Bengal Tigress, a Treatise on Gender*

Equality, Naskar wrote, "A sex worker deserves a billion times more respect, than the mystical fraudsters of the society, such as astrologers, psychics and tarot card readers. Science is the human endeavor to elevate the self and the society from the darkness of ignorance into the light of wisdom." "Science is the most effective, efficient and magnificent path that leads towards the salvation of humankind."

Naslin, Taslima: Muslim feminist. 1998

Nationalism, concept of allegiance to a cohesive community encompassing many cities and lands, i.e., a nation-state rather than a city-state. 1300, 1517, c.1750, 1768, 1772-Herder, 1933-Einstein .

Natural History of Creation 1862, Ernst Haeckel; it popularized Darwinism. 1862

Natural law: Isaac Asimov, "There is very little flexibility in the behavior of the universe. What it does once, it does again." A statement that describes and explains how phenomena behave. A hypothesis or postulate, once verified by the scientific method, becomes a law. Such laws do not have absolute certainty like arithmetic, but are valid until superseded by a law that better explains or predicts.

Thomas Paine: "Man does not make the laws of nature, he only discovers them."

Natural rights: popular as it is a concept of rights inherent to people, not given by a ruler or a god, but ambiguous in practice."Natural rights" vary over time and by culture and by prevailing ideology and are thus not "natural," but are man-made (Locke, Hobbes, Mill). One man's natural right could be another man's crime. Up until modern times women and slaves were not considered to have the same "natural rights" as males. Even the men of the *Enlightenment*, who wrote the *US Declaration of Independence* and the *Constitution* did not consider women, slaves, propertyless freemen, or Indians to have the same "natural rights" as white propertied males. 1625-Grotius, 1689-Locke, 1776-Locke, 1790-Burke, 1859-Mil

Natural monopoly: industries where a single provider can provide a service or product at a lower cost than two or more firms, where the delivery costs are high in comparison to the substance delivered, such as providing electricity, natural gas, or water.

Natural selection: name Darwin chose to explain his theory of evolution to distinguish it from *artificial* selection (used by farmers). 1779-Hume, 1832, Darwin, 1844-Darwin, 1855-Wallace, 1858-9-Darwin, 1859, '62, '71-Spencer, 1871-Darwin, 1887, 1899-De Vries, 1900, 1907-Bergson, 1932-Haldane, 1973-

Anthropic

Natural Theology: arguments for God based on evidences and inferences from the natural world, like Aquinas's cosmological arguments and the *Design Argument*. All natural theology arguments require an inference from the knowable, the natural world, to the unknowable, a god. 335 BC-Aristotle, 1273-Aquinas

Naturalism: is committed to a methodological principle within the context of scientific inquiry, i.e., all hypotheses and events are to be explained and tested by reference to natural causes and events. No supernatural or transcendent causes. Naturalism is of two fundamentally different types. 1. Philosophical naturalism (also known as metaphysical naturalism or ontological naturalism). which rejects belief in the supernatural. Physical reality is all that exists. It is a metaphysical position. (Paul Kurtz). And 2. Methodological naturalism. Which says one could believe in the supernatural but as a scientist he should not appeal to its existence. He could believe that there is room for both in a plausible world view. AD50-Wang Ch'ung, 550, 1140, 1670, 1885-Leo 13, 1993-Plantinga

Nature, On: Anaximander. 590 BC, 350 BC

Nature of Things, On the: Titus Lucretius's Epicurus's atheistic philosophy explanation of events c 60 BC

Nature of the Gods: On the: Cicero. c.45 BC

Nazi: National Socialist German Workers Party: Hitler's political party, AD 386, 1751, 1817, 1927, '33, '35, '43, '45, '91, 2015

Neanderthal, either a sub-species of *Homo sapiens* or a sister species as they interbred with *Homo sapiens* to a slight degree. Extinct c.40,000 BC. 370K BC, 200K BC, 110K BC, 40KBC, 1856, '86

Nebula: (cloud) original name for galaxies when galaxies were thought to be cloudy blobs visible apparently within the *Milky Way*, i.e., before the 1920s when Hubble proved that galaxies were groups of millions /trillions of separate stars way beyond the *Milky Way Galaxy*.

Nebular Hypothesis of planetary formulation: first proposed by Swedenborg in 1734, developed independently by Kant in 1755, then by Laplace in 1796, that the *primaevial* universe was a chaotic nebulous cloud of dust and particles that gradually began to coalesce by gravity to form stars, planets and galaxies. It is now accepted. 1734-Swedenborg, 1755-Kant. 1796-Laplace.

Nebuchadnezzar: Babylon king, exiled Jews. 586 BC

Nehru, Jawaharlal: Brahmin, jailed by Brits 12 years, with Mahatma Gandhi, gained independence for India. 1947

- Nemesis:** Greek goddess, punishes the arrogant 750 BC.
- Neo-fascism:** usually includes ultranationalism, racial supremacy, authoritarianism, . . . and anti-immigration sentiment, and opposition to liberal democracy,
- Neolithic Age:** 11000 BC, 5000 BC, 3000 BC
- Neo-Platonism:** AD 230, Theory that sought to reconcile Platonic philosophy with Christian thinking.
- 230-Plotinus, 413-Augustine, 862-Eriugena, 1000-two truths, 1190-Maimonides, c.1450-Cosimo de Medici .
- Nernst, Walter:** formulated the *Third Law of Thermodynamics*. 1906
- Neuborne, Burt** wrote *When at times the Mob is Swayed: A Citizens Guide to Defending Our Republic*, describes 20 political techniques used by Hitler and copied by Donald Trump.
- Neumann's law** (1831) Franz Ernst Neumann (1798-1895)
The product of the relative molecular mass and specific heat capacity for all compounds having the same general formula being similarly coordinated.
- von Neumann, Oskar:** economics, *Utility Theorem*. 1944
- Neuroanatomy:** the study of the anatomy of the brain
- Neuroscience:** the study of the function of the brain.
- Neurosis:** a mental disturbance or disease.
- Neutron:** a sub-atomic particle slightly heavier than a proton but with no electrical charge. Neutrons consist of three kinds of quarks (elementary particles) which are mediated by gluon. 1860, 1919-Rutherford, 1932-discovered by Chadwick, 1934-Szilard, 1950, See Atom, this Index
- Neutron star:** compact remnant of a star massive enough to become a supernova but not so massive that a black hole develops.
- Neutrino:** extremely light elementary particle of almost pure energy, affected only by gravity and the weak nuclear force. Possible candidate for dark matter. Posited first in 1930 by Wolfgang Pauli. Its existence was confirmed in 1956. See Atom, p 449.
- New Astronomy, The:** Johann Kepler. 1609
- New Synthesis, The:** Edward O Wilson. 1975
- New Testament, The:** name given to those writings of early Christian Jews which collectively became accepted as holy scriptures for followers of Jesus; later asserted to have been inspired by God. It and the *Old Testament / Hebrew Bible* constitute the *Christian Holy Bible*. 900 BC, AD 45-Paul, AD 70, 200-finalized, 1525, 1793-Paine, 1847-Bierce, 1864, 1893
- Newlands, John:** saw patterns of characteristics among elements. This concept was then regularized by Mendeleev in 1868
- Newman, Ezra:** astronomer, p. 428
- Newman, John Henry:** Anglican priest, then Catholic cardinal and saint. "I do not see the difference between avowing that there is no God (atheism) and implying that nothing definite can for certain be known about Him." 1864, '72 (This would now be considered "soft atheism.")
- Newton, Isaac:** preeminent scientist, discovered calculus 1665, developed the concept of gravity, laws of motion, rules for reasoning, "The great ocean of truth lay all undiscovered before me," experimented extensively with alchemy (falsely believing that elements can be made into gold), p.1, 335 BC-Aristotle, c.825, 910, c.1000, 1020, 1317, 1350, 1590-Galileo, 1600, 1609-Kepler, 1612-Galileo, 1620-Bacon, 1661, 1663-70, 1675, 1683-4- *De Motu / On Motion*, 1687- *Philosophiae Naturalis Principia Mathematica / Mathematical Principles of Natural Philosophy*, 1689-90, 1697, 1700, 1704- *Optiks*, *Universal Arithmetic*, 1707, 1714-Leibniz, 1735-6-Euler, 1783-black holes, 1799-Laplace, 1871, 1879-80, 1886-Mach, 1896, 1900, 1907, 1913-relativity, 1918-gravity, 1926-quantum, 1927, 1962-Kuhn, 1973, and pp. 418, 423-4, 426, 428-9, 434-5, 444, 453-4, 457, 472-3, 476, 483-4, 488
- Newton:** A newton the scientific unit of force
- Newton, Thomas:** Anglican bishop, noted similarities between pagan and Christian customs. 1754
- Nicholas 5, Pope,** authorized the Portuguese to enslave Muslims. 1452
- Nicholson, Seth:** in 1930, measured surface temperature of Mars. p. 435,
- Nicholson, William:** electrolysis. 1800
- Nicolas of Kues:** cardinal, *Reconciliation of Opposites*. Earth may not be the center of the universe. 1445,
- Nicolas of Oresme:** astronomer, pre-Copernicus. 1514
- Nicomachean Ethics,** Aristotle. 335 BC
- Niebuhr, Reinhold:** theologian, "The tendency to claim God as an ally for our partisan values is the source of all religious fanaticism." "Men fight as desperately for power and glory as for bread." p. 401
- Nietzsche, Frederick:** *Also Sprach Zarathustra, Beyond Good and Evil*, "The two great European narcotics, alcohol and Christianity." 1532, 1807, '82-3, '86
- Nihilism:** word popularized by Ivan Turgenev in 1861 for the rejection of all traditional values. 1883
- 1984:** by George Orwell, a grim totalitarian future. 1949
- Ninety Five Theses:** Martin Luther. 1517
- Nintu:** Sumer Earth goddess. 5000 BC
- Nirenberg, Marshall:** Robert Holley, and Har Khorana isolated transfer RNA and determined the sequence and structure of alanine tRNA, the molecule that incorporates the amino acid alanine into proteins. 1964

- Nirvana: in Hindu theory, a condition of happiness arising out of the absolute cessation of desire.
- Nixon, Richard M: Republican president of the US. Said, "I would have made a good pope." "If the president does it, that means it's not illegal." He developed the successful white supremacist "Southern Strategy" for the Republican party wherein Republican became the party of White racists.. Resigned in disgrace 1974.
- Noah: mythical Hebrew biblical figure who survived a great flood with his family and animals. In the 1700s, as many new species were being found by world explorers, theologians said Noah's ark was really six times larger than first claimed. 586 BC, 1769
- Nobile, Umberto , explorer, north Pole, 1926
- Noether, Emmy: important physicist. German. 1915
- Nominalism: theory that concepts, abstract terms, universals, represent no objective real things, they are just names. 1096, 1121, 1273-Aquinas, 1331-Ockham
- Non-Aristotelian logic: al-Farabi. 910
- Non-Euclidian geometry, used by Einstein to describe space-time. 1905,
- Noumenon: for Kant, the ultimate reality, or Thing-in-Itself, which can be conceived by thought, but cannot be perceived in experience.
- Nova theoria lucis et colorum*: Leonhard Euler. "Light's diffraction is best described as a wave." 1736
- Novum Organum*: by Francis Bacon, a compendium of then current knowledge. 1620
- Nuance, a slight variation in expression .
- Nuclear winter theory: After a nuclear war, dust in the air would block sunlight, killing all plants. Recall 1816, the year of famine without a summer due to the 1815 eruption of Krakatoa.
- Oath of Abjuration*: 1581, of Holland from Spain. 1776
- Objective: independent of the perceiving individual; in Spinoza, as existing in thought.
- Obstacles to clear thinking:1286-Roger Bacon numerous examples. pp. 398-402,
- Occasionalism: See Malebranche, this Index
- Ockham, William of: Franciscan, skeptic, *Ockham's Razor*, c.1331, cut away all irrelevant arguments. 1331, 1524, '90, 1633, '87, 1869
- Odyssey*: Greek epic, attributed to Homer. c.900 BC
- Oersted, Hans Christian: 1820, electricity and magnetism are both aspects of electromagnetism. p. 424
- Ogilvie, William: Scot, philosopher, land reform, *The Right of Property in Land*. 1782
- Ohm, George, In 1827 discovered Ohm's law, that voltage is current times resistance. 1843 p. 426
- Old Testament* / see *Hebrew Bible*
- O'Hair, Madalyn Murray "the difference between an atheist and an agnostic,. . . guts." 1991
- Oldham, Richard: earthquake waves. 1906
- Oligarchy: system of government where power is vested in a few persons or families, such as the Roman Republic, Saudi Arabia, Central American countries, Incan Peru. 387 BC
- Olmsted, Kathryn S, *The Newspaper Axis: Six Press Barons Who Enabled Hitler*, 1928
- Olmec: defunct Mexican civilization. 6K BC, 1300 BC
- Omar / Umar: second Muslim caliph. 642
- Omar Khayyam (A loaf of bread, a jug of wine, etc), solved cubic equations. 1066
- Omnipotence Paradoxes*, AD 414
- Ontological Argument* for God: argument based on reason alone. Anselm, 1076
- Ontology: the study of the nature of being, existence or reality, the search for a rational explanation of the nature of existence. The branch of metaphysics concerning the nature of being.
- Onward, Christian soldiers, marching as to war,
With the cross of Jesus going on before.
Christ, the royal Master, leads against the foe;
Forward into battle. See His banners go!
Refrain:
Onward, Christian soldiers, marching as to war,
With the cross of Jesus going on before.
At the sign of triumph Satan's host doth flee;
On then, Christian soldiers, on to victory!
Hell's foundations quiver at the shout of praise;
Brothers, lift your voices, loud your anthems raise.
Like a mighty army moves the church of God;
Brothers we are treading where the saints have trod
We are not divided, all one body we,
One in hope and doctrine, one in charity.
Crowns, thrones may perish; kingdoms rise & wane
But the church of Jesus constant will remain.
Lyrics by Sabine Baring-Gould in 1865
- Oort, Jan: posited dark matter, also posited that long period comets came from a specific area in space 10,000 astronomical units from the Sun, now called the Oort Cloud. 1932, p. 435-6
- Oppenheimer, Robert: director of the project that built the atom bomb. "There is no place for dogma in science. The scientist is free and must be free to ask any question, to doubt any assertion."
- Oppy, Graham: 2006
- Optics: the science of light and color. p.1, 711, 1020-al-Haytham, 1085-Toledo, 1225, 1247 Bacon, c.1430, 1595-microscope, 1669-Newton. 1860. (See spectrography, this Index)
- Opus Majus*: Roger Bacon. 1267
- Orbiting teapot: concept, Bertrand Russell. 1912

Order in nature / the uniformity of nature. Events in nature always act in a regular fashion as if they follow certain laws, it enables and facilitates analysis of natural events, and increases the credibility of inductive arguments. It is accepted by all scientists, 3000 BC, 600 BC, 1620-Bacon, 1687-Newton. 1700

Organic compound: a chemical containing carbon.

Organon: Aristotle's analysis of logic. 335 BC

Origen: *De Principiis*, God was a Platonic God. Origen is seen as the founder of biblical scholarship. Said, Much in the *Bible* is symbolic, so seek its deeper meaning. AD 150

Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life: most important scientific book of the 19th century. Charles Darwin. 1859

Original Sin: Concept first described by Paul, not Jesus. Adam's disobeying God by eating from the Tree of Knowledge was so important that having a human having knowledge brought evil into the world and imparted all humans forever with a propensity to sin and condemned all mankind (including babies), to Hell forever unless they accepted Jesus as God. The technique of claiming a peril and offering a solution on the speaker's terms is common for clergy, pharmaceutical companies, salespeople, and demagogues) 586 BC, AD 45, AD 70, AD 277, 413. 1000, 1076, 1414, 1524-Zwingli did not accept it, 1536-Calvin, 1696, 1751-Hume, 1993-Plantinga

Originalism: an American legal theory of interpretation of Constitutional provisions purportedly faithful to the *Constitution* as originally adopted, but in fact a political right-wing cover used selectively when necessary to justify a right-wing political or economic court decision. Justice Brennan called it "arrogance cloaked as humility." Liberal scholars have outed it. Erwin Chemerinsky, dean of UC Berkeley School of Law wrote (before the Supreme Court in 2022 took away women's federal right to an abortion): "Never in American history, thankfully, have a majority of the justices accepted originalism. If that were to happen, there would be a radical change in constitutional law. No longer would the Bill of Rights apply to state and local governments. No longer would there be protection of rights not mentioned in the text of the *Constitution*, such as the right to travel, freedom of association, and the right to privacy. This would mean the end of constitutional protection for liberties like the right to marry, to procreate, to keep the family together, to purchase contraceptives, to abortion, to engage in private consensual same-sex activity, the right of parents to control the upbringing of their children. No longer would women be protected from

discrimination under equal protection."

Saul Cornell, Chair of American History at Fordham calls originalism a "Constitutional scam" for several reasons, *inter alia*, "its methodology is murky, its practices dubious," and it's "bad history shaped to fit an ideological agenda." The founders of the *Constitution* had divergent views. It is "little more than an intellectual shell game in which contemporary political preferences are shuffled around and made to appear part of the *Constitution's* original meaning."

Brett Parker in *The Stanford Political Journal* called it "a racist and intellectually dishonest fringe theory ill suited for today's society."

Jill Filipovic, an attorney and author, summed up current legal opinion, "[O]riginalism" is a farce, something no judge in American history has adhered to- including the theory's biggest proponents. Instead, it's a rational-sounding cover for a more insidious set of right-wing beliefs, a way to allow rampant discrimination against actual people while protecting the interests of corporate "persons" and promoting the extreme ideologies of lobby groups."

In 1857, Chief Justice Roger Taney in the *Dred Scott* case, wrote "the framers of the *Constitution* did not regard Negroes as being among the "people" or whose benefit and protection the US government was founded." The "framers" had many motives, some pro-slavery, some anti-slavery. Criticism of slavery was dropped to get the votes of racists of Carolina and Georgia. So the *Constitution* said nothing about the then common practice of slavery. So slaves were property.

In recent years, liberal theorists have claimed to be originalists, to show that originalism is merely jargon to rationalize decisions reached for real reasons. **Garrett Epps:** If, originalism were no more than an academic fad, we . . . would not need to concern ourselves over much with it. But judges use it as a well-developed set of rhetorical tropes by which conservative judges justify their decisions, particularly those that overturn established precedent or further anti-democratic goals. (Justices claiming to be originalists are in the majority on the Supreme Court as of 2025)

Orsini: noble Roman family, imprisoned Boniface. 1305

Ortelius, Abraham: printed first modern atlas. 1570

Orthodox Christian churches: national sects of the Eastern Orthodox wing of Christianity. 1000, 1054, 1139, '50, '60, 1453, 1517, 1870,

Orwell, George / Eric Blair: 1984 (a bleak novel of a Soviet totalitarian future). *Animal Farm* (an allegorical novel that ridiculed the Soviet system. "All animals

are equal, but some animals are more equal than others.”) 1532, 1880, 1941, ‘45, ‘49, p. 465-6

Osiander, Andreas: After Copernicus died, Osiander wrote a preface to Copernicus's *Revolutions* saying heliocentrism was just a speculation. 1543

Osiris: Egyptian god, supposedly died and resurrected. 4000 BC, 3400 BC, 2400 BC, 300 BC, AD 30, AD 45

Ostrogoths: invaded Roman Empire. Bought off. 410

Otis, James Jr.: “God made all men have naturally equal rights. . .taxation without representation is tyranny.” 1761

Otto, Nicolas August : German, built the first four stroke internal combustion engine. 1876

Ovid: Roman poet, *The Art of Love*. c AD 8

Owen, John: anti-Copernican, 1543

Owen, Robert: Brit, utopian social reformer. 1825

Owen, Richard: prominent foe of *Darwinism*. 1860

Oxygen / Oxidation: burning, chemical combining something with oxygen, from paper yellowing with age to rust to fire to explosion. 1665, 1775, ‘79, ‘89, 2017

P

Paganism: religion of Greece and Rome, with numerous anthropomorphic gods with specific areas of supernatural power. c.900 BC-Jews, c750 BC-Greek gods, 586 BC-*Hebrew Bible*, 620 BC-Background, 509 BC-Rome, 399 BC-Euthyphro, AD 60-Jesus, AD 65AD 65-Paul's argument, AD 70-Mithraism, Gospels, AD 230-Neo-, AD 321, 325, AD 325-Constantine, 410-Rome falls, 413-Christianity, 415-Hypatia, 431-Ecumenical, 450, 520, 529-Justinian, 610-Islam, 644-Qur'an, 1095, 1140-as noted, 1212-all the churches, 1452-slavery, 1484-under torture, 1532-Conquistadors, 1754-Religion, 1759-Voltaire, 1776-Gibbon, 1835-Political, 2001-Billy Graham, 2016-How we think

Paglia, Camille: US feminist, philosopher. “The motto of my feminism is, “Deal with it.” We cannot have a society where we are constantly running to other people to complain.”

Paine, Thomas: Brit, writer and inspiration for the American Revolution, He was also an inventor. He designed the iron bridge to span the Skuykill river. His words were the soul of the Revolution. 1624-Deism, 1776-*Common Sense* and *The American Crisis*, 1779, 1793, and 1795-*The Age of Reason*, 1797-*Agrarian Justice*.

Paleolithic Age: Old Stone Age. 700K BC, 30K BC

Paleontology: the science of the forms of life existing in earlier geologic periods as shown by fossils. 1545, 1796, 1956, ‘72, ‘96

Paley, William, Rev.: devised the "watch found on 1802

Palter, (verb): William Blake, “A truth that's told with bad intent, Beats all the lies you can invent.” Like a

half truth. A logical fallacy. p. 443

Pandian, Jacob: anthropologist. 1800

Pangaea: First continent, split into current continents. 250 million BC, 1911

Pangloss: Character in Voltaire's *Candide* meant to ridicule Leibniz. 1755

Panspermia: the hypothesis that life on Earth was transported from some other planet. First proposed by Aristarchus c280 BC. Later by J B S Haldane. 1932

Pantheism: God is everything, love, truth, nature, beauty. A definition of God, not an argument for God: as Nature's existence is self evident. the doctrine that God is immanent in all things. Advocated by: inter alia: Descartes and Spinoza. Stoics, The whole universe is a manifestation of God. 300 BC: 1576: 1670-Spinoza: 1808: 2000

Panza, Sancho: servant of Don Quixote. 1605

Pappas, Stephanie: 2012

Paracelsus: modernized medicine. 1527

Paradise: Muslim, an oasis with virgins and wine. 644

Paradigm: a world view, word coined by Thomas Kuhn to describe a particular mind-set of scientists and historians, and to help explain the progress of scientific thinking. 335 BC, 1796, 1962

Paradox: 1. a person or thing that has contradictory features or qualities. 2. A statement seemingly self-contradictory or absurd, but which may be true, z.b., the statement, “Jefferson and Washington were traitors.” In England true, as they actively fought against the then established British government of the American colonies. But for Americans, they are patriots, heroes.

Parker, Brett: legal scholar, critic of *Originalism*. 1980s

Parker, Theodore: Boston Anti-Slavery Society, government over all, by all, for all. 1854, 1863

Parks, Rosa: Wouldn't give up her bus seat. 1955

Parmenides: Greek philosopher, There's only one eternal reality. 515 BC

Particles: Sub-atomic bits of matter. Leptons, quarks, and gauge bosons that are not known to be composed of any smaller components are elementary particles. Ultimately, "fields" are regarded as more elemental than quarks. See Atom, pp. 449, 490, 494, 499

Pascal, Blaise: *Pensees / Thoughts* 1670, "All the dignity of man consists in thought." “Wager God exists as there's no downside. 1654, 1670, 1988, 2002, pp. 396, 413, 416, 418,

Pasteur, Louis: did not originate the germ theory of medicine, but did research it and in 1862 published his research. He invented Pasteurization, first for wine, then for milk, heat liquid just under boiling temperature, 1856-pasteurization, 1862-germ theory, 1884-rabies vaccine, 1973

Patrick, Saint: Ireland, a former slave. 413

Patriotism: Veneration of one's own country, used by the ruling class as a technique of social control. For Samuel Johnson, patriotism is the last refuge of a scoundrel; for Ambrose Bierce, the first; for H L Mencken, it is the first, last, and middle range of fools. 500 BC-Shinto, 1532-fraud, 1755-Johnson, 1776-Paine, 1805-Walter Scott, 1819-Schoepenhauer, 1847-Wilde, 1916-Shaw, 1925-Mencken, 1933-fascism. See 1532 for quotes on use of patriotism as a device to rule.

Patterns of Culture, Ruth Benedict, anthropological study of three native cultures, Zuni in New Mexico, Kwakiutl of Vancouver, and Dobu in Melanesia. 1934

Paul 3: Pope, 1540s, father of Pier Farnese. 1492, 1542-3-slavery-Copernicus, 1862-Acton

Paul 4: Pope, instituted the *Index of Prohibited Writings*. 1559, p. 416

Paul 5: Pope, anti-Galileo. 1615-Bellarmino

Paul 6: Pope. "There must be something radically wrong with [Capitalism] that gives rise to such social injustice. 1968

Paul, Saint: Jewish rabbi, most responsible person for the creation of the Christian Church c AD 45.

Pax Ecclesiae: Urban 2, no fighting near churches. 1096

Pavlov, Ivan: conditioned reflexes. 1927

Payne, Cecilia: the Sun is 90+% hydrogen. 1925

Peano, Giuseppe: symbolic logic c.1912. 1931

Peasant Revolt: AD 70-Heaven, 200- *New Testament*, 392, 413-Augustine, 500, 862, 1759-Voltaire, 1779-Hume, 1864-*Bible*, 1916-Shaw, 1381-Wat Tyler's revolt, 1524-25-Luther-Slay, crush the peasants.

Peebles, James: 1966- *Big Bang* model predicted the correct abundance of helium. 1966, p.435

Peirce, Charles: American, founded Pragmatism. 1890

Peloponnesian Wars: Athens and its allies vs. Sparta and its allies, 531-500 BC

Pelosi, Anthony: Scottish doctor, revealed intellectual dishonesty of eminent psychologist Hans Eysenck 2012

Penicillin: Miracle drug, discovered by Dr. Fleming in 1928. He published. No reaction. 1941

Pensees/Thoughts: Pascal, "Wager God exists." 1670

Penrose, Roger. In *The Emperor's New Mind*, argued that known laws of physics are inadequate to explain the phenomenon of consciousness. 1989.

Perceval: French epic poem 13th century. 1200

Pericles / Age of Pericles: gave a funeral oration extolling Athens's democracy. 431 BC

Periodic Table of Elements: 1869, Dimitri Mendeleev arranged elements by atomic weight. In 1914 it was corrected to arrange elements by atomic number (i.e., number of protons), 1869, 1914, '73

Persia / Persians: 3500 BC, 2400 BC-Mithra, 600 BC, 586 BC-Babylonian exile, 540 BC, 529 BC-Cyrus, 490 BC-attacked Greece, 431 BC, 334 BC-Alexander, 200 BC, 150 BC, AD 30, 150-Bible, 410-Fall of Rome,

550-Dark Ages, 642-Muslims, 644, 718, 825-Khwarizmi, 800-Science, 910-Adolphi, 1000-Avicenna, 1146-Biruni, 1250-Rumi, 1258, 1307-al-Shiraz, 1405, 1844-Baha'i, 1721

Pestalozzi, Johann, innovative educator, 1801

Petronius: sophist, 40K BC

von Peurbach, Georg: mathematician, Austrian, in

1456 published how to calculate sines and chords of angles for trigonometry, the method of calculation using ratios of the sides of triangles and the angles between them.

Phenomena: in philosophy, things and events perceived through the senses

Phenomenon of Man, The: Teilhard de Chardin. 1956

Phenomenology: The philosophical study of the structures of experience and consciousness. It is not a doctrine or a philosophical school, but rather a style of thought, a method, in contrast to Descartes who saw the world as objects, sets of objects, and objects acting and reacting to each other. It attempts to create conditions for the study of topics usually regarded as subjective, like judgments, perceptions, and emotions.

Philip 4: French king, stole Knights Templar's money 1305

Philosophe: French intellectual during the *Enlightenment*, anti-clerical, anti-king.

1624-deism, 1670, 1700- *Enlightenment*, 1725- Scottish *Enlightenment*, 1730, 1733-Voltaire, 1736-Frederick 2, 1751- *Encyclopedie*, 1761-d'Holbach,

Philosophiae Naturalis Principia Mathematica

"*Principia*"): established classical physics. by Newton, 1687

Philosophie Zoologique: 1809, Lamarck, 1809

Philosophy: has many definitions. Its most abstract and basic definition is the pursuit of knowledge and wisdom. Traditionally it has four main branches, Metaphysics, Epistemology, Logic, and Ethics. Aesthetics is sometimes considered a fifth branch. Some views regarding philosophy:

Strathis Psillos, Science tells us what the world is like. Philosophy tells us why we should take seriously that the world is like the way science says it is . . . Science relies on theories, hypotheses and principles which, typically but not invariably, go beyond the observable aspects of the world." .

A key task for philosophy vis-à-vis science is to create—or to contribute to the creation of—the very conceptual framework through which scientific theories represent the world.

Bertrand Russell, The finding of arguments for a conclusion given in advance is not philosophy but special pleading.

Henry Ward Beecher, The philosophy of one century is the common sense of the next.

Albert Einstein, In the periods of normal science, the scientist might well leave the philosophising about science to the philosopher. But when the stakes at higher, that is, when experience forces us to seek a newer and more solid foundation, the physicist cannot simply surrender to the philosopher the critical contemplation of the theoretical foundations; for, he himself knows best, and feels more surely where the shoe pinches. Roger Scruton, Brit, "Philosophy is committed to at least one all important claim: that there is a real distinction between the true and the false.

Knowledge for the sake of knowledge, so far from having anything aristocratic or sublime about it has some believe), would be an idiotic pastime for idiots or for the idiotic moments which we all have in us; in reality there is no such thing, it is intrinsically impossible and the stimulus ceases with the failure of the material itself and of the end of knowledge."

Peter A. Angeles: Philosophy defined: To give a speculative, systematic, complete view of reality; to describe the ultimate, real, nature of reality; to determine the limits, scope, source, nature, validity, and value, of knowledge; the critical inquiry regarding the presuppositions, and claims made by the different fields of knowledge.

James Anthony Froude: Philosophy goes no further than probabilities, and in every assertion keeps a doubt in reserve.

James Jeans: Physics and philosophy are at most a few thousand years old, but probably have lives of thousands of millions of years stretching away in front of them. They are only just beginning to get under way.

Jacques Maritain: Philosophy is the science by which the natural light of reason studies the first causes or highest principles of all things.

Richard Rorty: Philosophy makes progress not by becoming more rigorous but by becoming more imaginative. . . The ideal of philosophical ability is to see the entire universe of possible assertions in all their inferential relationships to one another, and thus to be able to construct, or criticize, any argument.

Alfred North Whitehead: A philosopher of imposing stature doesn't think in a vacuum. Even his most abstract ideas are, to some extent, conditioned by what is or is not known in the time when he lives. All the world over and at all times there have been practical men, absorbed in 'irreducible and stubborn facts; all the world over and at all times there have been men of philosophic temperament, who have been absorbed in the weaving of general principles. It is this union of passionate interest in the detailed facts with equal devotion to abstract generalisation which forms the novelty of our present Society.

Michel de Montaigne: To philosophize is to doubt Wonder is the foundation of all philosophy, inquiry the progress, ignorance the end.

David Thoreau: To be a philosopher is not merely to have subtle thoughts, nor even to found a school, but so to love wisdom as to live according to its dictates, a life of simplicity, independence, magnanimity, and trust . . . If you would learn the secrets of nature, you must practice more humanity than others..

Thomas Carlyle, What is philosophy but a continual battle against custom.

Will and Ariel Durant: It is good that a philosopher should remind himself, now and then, that he is a particle pontificating on the infinite. Will Durant: Knowledge is power, but only wisdom is liberty.

D W Hamlin: The lifeblood of philosophy is argument and counter-argument.

Arnold Toynbee: The history of morality and moral philosophy is the history of successive challenges to some pre-existing moral order. . .

A life that does not go into action is a failure, true for prophets, poets, and scholars as well as a "man of action".

Ludwig Wittgenstein: The object of philosophy is the logical clarification of thought. The world is the totality of facts (true statements about things) not of things.

Laurance Peter: Philosophy is that which lets the rich say that there is no disgrace being poor.

Robert M Hutchins: the systematic reflection on the common experience of Mankind.

Immanuel Kant: Metaphysics is a dark ocean without shores or lighthouses, strewn with many a philosophic work. #

Phoenician alphabet: modified, it became the Greek alphabet. c750 BC

Philastrus: bishop of Brescia, compiled a catalog of heresies, wrong beliefs. AD 384

Photoelectric effect: When a light is shone onto the surface of a solid, electrons are released. 1785-1839, 1900, 1905-Einstein, p. 277-385- *Electromagnetism Timeline*, 1913, 1919, 1927

Photon: an elementary particle of energy from the visible light portion of the electromagnetic spectrum, a boson that carries the electromagnetic force, a quantum particle of light. It has minimal mass, it is pure energy. 1900-Planck, 1905-Einstein, 1924-de Broglie, 1952-Feynman, See Atom p. 449 Photonic energy is the energy of a single photon. The amount of energy is directly proportional to the photon's electromagnetic frequency and thus, equivalently, is inversely proportional to the wavelength. The higher the photon's frequency, the higher its energy. Equivalently, the longer

The photon's wavelength, the lower its energy.

Physics: 1. a set of the laws of the natural universe, its language is mathematics, 2. the study of the motion and interactions of matter and the transformations between different forms of energy, the most basic science. Physics concerns what we can say about nature, not what nature is. 160+ references herein.

Piaget, Jean: educational psychologist, theorist. 1929

Piers Plowman: Allegorical poem, W. Langland. 1376

Piketty, Thomas: French economist, "Capitalism automatically generates arbitrary and unsustainable inequalities that radically undermine the meritocratic values on which democratic societies are based." 1913, 2013, '20, pp. 390, 395

Pinker, Steven: *The Better Angels of Our Nature: Violence Has Declined*, "The elevation of parochial values to the realm of the sacred is a license to dismiss other people's interests, and an imperative to reject the possibility of compromise." 2012

Pinzon family of Palos, Spain: shipbuilders, sailors, contributed 1/3 of financing for Columbus, provided and captained two of Columbus's three ships. The third brother was Columbus's first mate. 1492

Pitt, William: British PM. "Power is apt to corrupt. . . Necessity is the plea of every infringement of human freedom. It is the argument of tyrants; the creed of slaves. 1770

Pius 2: Pope / Aeneas Sylvius, visited England before he became pope, saw widespread squalor. 1430

Pius 9: Pope, wanted to return Catholicism to the 15th century, rigged the 1870 First Vatican Council to have himself voted infallible, 1864, '66, '70, '71, '93

Pius 12: Pope (1939-58) has been criticized due to his silence during WW 2 regarding the murder of millions of Jews. He never publicly criticized Hitler or German treatment of Jews or mentioned the Holocaust. It is most likely that with his enormous organization that he was aware of Hitler's actions. The issue is not whether he never publicly criticized Hitler but whether his silence was justified. His defenders have worthwhile arguments. Some events: In September 1942, Monsignor Montini (future Pope Paul 6) told Pius, "the massacres of the Jews reach frightening proportions and forms".

Later that month, Myron Taylor, US representative to the Vatican, along with representatives from Great Britain, Brazil, Uruguay, Belgium, and Poland told Pius that the Vatican's "moral prestige" was being injured by its silence on atrocities. Pius's most public criticism of what was the ongoing massive slaughter of Jews was his 1942 Christmas radio message wherein he said, *inter alia*, ". . .

mankind owed a vow to hundreds of thousands of persons who, without any fault on their part, sometimes only because of their nationality or race, have been consigned to death or slow extermination." He did not say he was referring to Jews. 1945

de Pizan, Christine: important feminist, 1405

Planck, Max: light travels in discrete packets, quanta. 1900-quanta, 1905-Einstein, 1906-entropy, 1907- Einstein, 1927-relativity, 1973-Anthropic p. 2-formation, 3000 BC, 1734-Swedenborg, 1755-Kant, 1779, 1795-Paine. 1830-Mormons, 1932-Oort, 1968-Pluto, 1973-Anthropic

Planetary motion: 540 BC-Pythagoras, 335 BC-Aristotle, 350-Ptolemy, 628-Brahmagupta, 900-Muslims, 1000-Biruni, 1060-al-Zarqari, 1340-al-Shatir, 1534- Copernicus, 1577-Brahe, 1600-Gilbert 1609-Kepler's laws, 1613-Galileo, 1657, 1664-Newton, 1684-gravity, 1687-Principia, 1799-Laplace, 1880-Pearson, 1896- Mach, 1927-Newton, many mentions in *the Astronomy/Cosmology Timeline*

Plantinga, Alvin: American Christian theologian, 413, 1751-Hume, 1977-free will defense, 1982, '92-3, '95, '99, 2007, '10, '14

Plasma: the extremely high-energy fourth state of matter where electrons are stripped from their atoms. A gas of positive ions and free electrons with little or no electrical charge. (The other states of matter are gas, liquid, and solid)

Plate tectonics: continents drift. 1911, 1944

Plato: student and biographer of Socrates, *The Republic*, "Philosophy, the noblest pursuit of all." "An imbalance between rich and poor is the oldest and most fatal ailment of all republics." "When a tyrant first appears, he is a protector." 385 BC, p. 1, 1300 BC-Golden rule, 650 BC, 425 BC-Socrates, 399 BC-free speech, 387 BC-Suffering's beliefs, 335 BC-Aristotle, 300 BC- *Problem of Suffering*, 150 BC-Academy, 44 BC, AD 150- Christianity, AD 230-Neo-Platonism, 415-Hypatia, 529-Justinian, 910-al-Razi, 1150-Scholasticism, 1190-Maimonides, 1200, 1273-Aquinas, 1331-Ockham, 1441-Nicolas of Kues, 1509-Erasmus, 1514-Mersenne, 1690-Locke, 1755-Kant, 1759-Voltaire, 1789, 1796-paleontology.

Platonic math: Plato, mathematics has an independent objective existence true whether anyone believes it or not. So, math laws are discovered, not created. (Paine said same about all natural laws)

Playfair, John: geologist. 1802, 1820

Pliny the Elder: *Natural History*. AD 77

Plotinus: founded Neo-Platonism, one of most important events in philosophy and history AD 230

Plow / plough: most important farming invention. p.1, 9000 BC, 3500 BC, 3200 BC-Egypt, 2600 BC-oxen, 1100 BC-iron blade, 250 BC-China, 100 BC-Celts, AD 879-moldboard, 910-wheels, 1519-America

Pluralism: 1. the religious doctrine that different faiths are different human responses to the same transcendent reality, and thus equally valid. As persons are born into different cultures, they naturally develop different religions. John Hick was an eminent 20th century proponent of pluralism. 2. the doctrine that the world is not a unit in law and structure, but the scene of contrary forces and processes. (Ambrose Bierce would say, "All religions are equal, but some religions are more equal than others.") 1963

Plurality of Worlds: Conversations Concerning the, by Bernard Fontenelle. 1868

Plutarch: Greek philosopher, early cosmologist. 300 BC- *Problem of Evil*

Plutus: comedy by Aristophanes, 425 BC

Polanyi, Michael: chemist, made important theoretical contributions to physical chemistry, economics, and philosophy. 1993

Political Theory: theories of government:

von Bismark: Politics is the art of the possible. 2400 BC-religion, 387 BC-Plato, 335 BC-Aristotle, 300 BC-Greek individualism 787-investiture dispute, 1215- Magna Carta, 1273-Aquinas, 1324-Marsiglio, 1532-Machiavelli, 1586-Bodin, 1609-nation state, 1625-Grotius, 1688-Locke, 1721-Montesquieu, 1748- *Spirit of the Laws*, 1750-nationalism, 1775-Burke, 1779-Madison, 1789-Bentham, 1789-Robespierre, 1790-Burke, 1793-Godwin, 1795-Napoleon, 1820s-socialism, 1826-Disraeli, 1835-Tocqueville, 1848-Marx, 1859-Mill, 1879-George, 1881-Bakunin, -Renan, 1909-Becker, 1911-Magnon, 1938, 2016-Woodard.

Polo, Marco: Venetian (Korcula) described China the Far East. 1269, 1292-China, 1433

Polymer: a chain of carbon molecules, which can contain thousands of links (called monomers).

Polyphemus: son of Poseidon, 1509

Polytheism: the worship of many gods.

Pompey: leading Roman senator. 1st century

Pomponazzi, Pietro: *On the Immortality of the Soul* 1516. 1719

Pontius Pilate: Roman governor of Judea, crucified Jesus. c AD 30

Pope, Alexander: A little learning is a dangerous thing, Drink deep or taste not the Pierian spring. 1711

Popper, Karl: *The Logic of Discovery* (Popper's deductivism) 1687, 1748, 1927, 33, '40, '45, '57, '73

Poseidon: Greek god of the seas 750 BC.

Positivism: philosophy that recognizes only positive facts and observable phenomena without inquiry into ultimate origins. the restriction of philosophical to problems open to scientific methods. 1830-Compte, 1912-Whitehead, 1922-Wittgenstein, 1936-A J Ayer

Power, physical: mechanical, electrical, amount of

work done or energy transferred per unit of time. 1592, 1600-Bacon, 1609-Althusius, 1765-Watt, 1776-factory, 1800s-industrial, 1848-Marx, Power is Social. Political. Intellectual. predictive, Argumentative. religious. persuasive. priestly, subconscious. conversational, ability, electric. mythical. magnetic. Magical. Economic. Divine. Power of Nature: 1450, 1815-Tambora

Power, intellectual: 399 BC-Socrates, 387 BC-Plato, AD 200-Greeks, 1000-Avicenna, 1150-Church, 1209-Aristotle, 1269-Aquinas, 1339-Humanism, 1686-*Enlightenment*, 1700-philosophes, 1755-Kant, 1863- *Gettysburg Address*, 1900-Freud, 1912-Russell, 1936-Keynes.

Power, Supernatural: 9000 BC, 2700 BC, 2000 BC-Hindu, 750 BC-Greek gods, 620 BC-Zarathustra, 528 BC-Gautama, 350 BC-Lao-Tse, 300 BC-Mill, 250 BC-China, 65 BC-Cicero, AD 150-Ptolemy, 161-Aurelius, 413-Augustine, 1076-Anselm, 1258-Zen, 1273-Aquinas, 1517-indulgences, 1524-Erasmus, 1532-Hobbes, 1596, 1611, 1657-numbers, 1570-Spinoza, 1710-Leibniz, 1759-magic, 1779-Hume, 1781-Kant, 1783-Mendelssohn, 1789-Jefferson, 1896-White, 1912-process theology, 1946-Cohen, 1950-God of the Gaps, 1963-Hick, 1973-Anthropic.

Power, political, military, economic: 814 BC-Carthage, 530 BC-Confucius, 431 BC, 425 BC-Socrates, 335 BC-Aristotle, 150 BC-domestic, 146 BC-Greece, 65 BC-Cicero, 44 BC-Caesar, 31 BC-Augustus, AD 321, 410-Gibbon, 413- Augustine, 476-Church, 591-Gregory, 642-Omar, 726-investiture, 750-Muslims, 787-investiture, 789-Charlemagne, 1000-The West, 1054-investiture, 1150-feudalism, 1300-Renaissance, 1305-investiture, 1324-Marsiglio, 1378-popes, 1397-Church, 1398-Hus, 1414-popes, 1450-Portugal, 1455-Europe, 1499-social, 1500-China firepower, 1516-Church, 1555-Peace of Augsburg, 1586-Bodin, 1619-Vanini, 1648-30 Years war, 1649-Cromwell, 1651-Hobbes, 1657, 1670-Spinoza, 1689-Separation of powers, 1690-Locke, 1748-Montesquieu, 1750-nationalism-Balance of power, 1751-Hume, 1756-Burke, 1764-Beccaria, 1770-Pitt, 1776-Paine, 1789-Adams, 1789- Wealth, 1790-Burke, 1793, 1800-colonialism, 1808-Goethe, 1826-Disraeli, 1881-Bakunin, 1882-3-Nietzsche, 1887-Acton, 1937-Pius 11, 2013-Francis, 1927-relativity, 1973-sea Power, 1756

Power, optical. 1609-10-Galileo, 1670-Hooke, 1673-van Leeuwenhoek, 1929-Hubble, 1448, 1873

Power, electrical. 1899-Rutherford, 1934-Szilard, pp.424-432- Electromagnetism Timeline

Power of Myth: The, Joseph Campbell. 1943, 1955

Power corrupts: A well known phrase. *Variations:* Plato's Republic, Only those with nothing to gain by ruling should be a Guardian.

Plutarch, No beast is more savage than man, when

**“You’ve got to be taught to hate and fear,
You’ve got to be taught From year to year,
It’s got to be drummed In your dear little ear.
You’ve got to be carefully taught!
You’ve got to be taught to be afraid
Of people whose eyes are oddly made,
And people whose skin is a different shade,
You’ve got to be carefully taught.
You’ve got to be taught before it’s too late,
Before you are six or seven or eight,
To hate all the people your relatives hate,
You’ve got to be carefully taught!” #**

Prejudice: an irrational negative opinion of a person or group. Discrimination is when one acts on his prejudice to the subject's disadvantage.

Pressure: force divided by the area that the force is on.
Priest: As used herein, someone claiming a connection with a god / God sufficient to tell people what such god / God says

Priestley, J B: political theorist, chemist, *Essay on the First Principles of Government* 1766, 1770, '68, '75-oxygen, '80-Political Theory, *Prince, The / Il Principe*: by Machiavelli, *realpolitik*, book describing methods, usually deceptive, recommended for rulers to keep the ruled classes docile. 1532

Principia: (Philosophiae Naturalis Principia Mathematica) Isaac Newton, basis of classical physics. p. 1: 1609, '87, '90-Locke, 1736-Euler, 1799
Principle of Population, On the: Thomas Robert Malthus, 1798, revised several times from 1798 to 1830s, inspired Darwin and Wallace. 1838

***Principles of Geology*, three volumes, Charles Lyell. 1830, 1832**

***The Principles of Nature and Grace Based on Reason:*
Gottfried Leibniz. 1714**

Principles of Philosophy / Principia philosophae:
Rene Descartes. 1644

Principles of Quantum Mechanics: Dirac. 1930

Principle of Sufficient Reason: a basic rule of thought proposed by Leibniz. c.590-Anaximander, 1710-Leibniz, 1714, 1819

**Printing: p.1, 300 BC, c.591-China, 1150-China, 1347-
Plague, 1454-Gutenberg, 1499-printing industry,
1500-Church permission, 1509- *Praise of Folly*, 1545-
Holy Inquisition, 1620-Bacon,
1753-Voltaire, 1936-money**

Privation Argument: proposed answer to *Problem of Suffering* 413-Augustine, 1273-Aquinas

Probability theory: the mathematical theory of processes involving uncertainty (such as gambling). 335 BC-induction, 150 BC-Carneades, 1654-Pascal, 1739-Hume, 1748-Hume on miracles, 1863-Mill, 1927-quantum theory, 1973-Dawkins, 1974-Plantinga, 1983-Hawking.

Problem of Suffering / The Problem of Evil /Epicurean

- Paradox:** the most important refutation of a god who claims omnipotence and benevolence. 586 BC, 300 BC, 150 BC, AD 117, 274, 413, 524, 591, 1273, 1536, 1670, '88, '88, 1710, '48, '51, '88, '98, '20, '25, '36, '55, '74, '82, '93, '90s
- Process philosophy / Process Theology:** any of a variety of theories emphasizing that the basic reality in the universe is not objects or substances but processes, associated with philosophers William James, Alfred North Whitehead, and Henri Bergeron. It asserts that Jesus was good, but not divine. 1912
- Proclus:** Head of Plato's Academy, a NeoPlatonist, defended Greek rationality in a Christian dominated culture. 475
- Prodicus,** Greek philosopher. 40,000 BC
- The Profits of Religion,** Upton Sinclair. 1918
- Progress, its Law and Cause,** Herbert Spencer, 1857,
- Propaganda:** Statements, usually biased or misleading, or using loaded words, used to promote a particular political cause. Hitler advised to direct -propaganda to the least educated class of people. Yuval Harari said, "You can have enormous social power by making a lot of people believe in fiction." For example, in recent times, a right-wing US politician, Newton Gingrich, advised members of his political party, irrespective of the merits of the situation, to demean members of the opposite party in all circumstances by using derogatory words, like "betray, cheat, corrupt, destructive, disgrace, failure, greed, traitor, hypocritic, insecure, pathetic, incompetent, waste, sick, lie, selfish." 1925, '34, p. 400
- Protagoras:** Greek philosopher, "Man is the measure of all things." 450 BC, 425 BC, 1687
- Protestant Revolt:** see Reformation. Luther and his allies, at the *Diet of Squires* "protested" against the *Diet of Worms* edict contra his movement. Hence the word "Protestant." 1529
- Protestantism:** Christian religions separated from the Christian Church based in Rome (Catholics). Will and Ariel Durant, historians: "Protestantism is triumph of Paul over Peter. Fundamental-ism is the triumph of Paul over Christ,"
- Proudhon, Pierre-Joseph:** French socialist. Property is theft. 1840
- Proust, Joseph:** French, chemical compounds combine in definite proportions. 1794
- Pseudo-Dionysius:** God can't be comprehended, 300 BC, 500, c.862-Eriugena, c.1000, 1273-Aquinas
- Psychology:** The scientific study of the human mind and its functions. 1651-Hobbes, 1750 love, 1930-Vygotsky
- Ptah:** Egyptian god who created the world. 3200 BC
- Ptolemy 1:** Soter / Savior, Macedonian general under Alexander, then ruled Egypt, founded the Museum, Library, and temple in Alexandria. 334 BC, 300 BC
- Ptolemy family:** ruled Egypt for 300 years. 334 & 300 BC
- Ptolemy, Claudius:** astronomer, geocentric universe. 335 BC-Aristotle-geocentric system, 150, 964-al-Sufi, 1400-map, 1440, '64, 1543-Copernicus
- Proton:** a sub-atomic positively charged particle. It and neutrons are an atom's nucleus. The number of protons in an atom determines what element it is and is its atomic number. 1855-Avogadro, 1913-Bohr, 1919-Rutherford, 1927-Dirac, 1932-Chadwick, 1939-Bethe, 1950-strong nuclear force, 1964-hadrons, 1973-stars. See Atom, p. 449
- Publius, Ovidus Naso / Ovid:** Roman poet. AD 8
- Pufendorf, Samuel:** (1632-94), German philosopher, Humans have an innate spark of divine reason. 1672
- Pulitzer, Joseph:** (1847-1911), American newspaper publisher, "Always fight for progress and reform, never tolerate injustice and corruption, always fight demagogues of all parties, never belong to any party, always oppose the privileged class."
- Pulsars:** stars discovered by Antony Hewish in 1973
- Purgatory:** Christian concept of a place where moderate sinners go to purify to wait out the penalties for their sins before being admitted to Heaven. Christian clergy turned it into a scam to get money from believers. 1095-indulgences, 1310-Dante, 1509-Erasmus, 1517
- Pusey, Phillip, Dr.:** anti-Darwin. 1864
- Pushkin, Alexander,** Russian poet, 1836
- Pyramid texts.** 2400 BC
- Pyrrho:** Skeptic, nothing can really be known. 334 BC
- Pythagoras,** founder of school of Pythagoreans, the universe follows natural laws; math is the key to understanding the universe;
- Pythagorean Theorem** the most important theorem in math. p.1, 620 BC-Greece, 540 BC-math, 387 BC-Plato, 1020-al-Haytham, 1267-Bacon, 24-Bacon, '87-scientific method.

Q

- Ibn Qayyim al-Jawziyyah:** astronomer, said the *Milky Way* was a myriad of tiny stars packed together in the sphere of the fixed stars. 1320
- Quantum:** an infinitesimal packet of energy
- Quantum algebra:** Heisenberg. 1925
- Quantum electrodynamics (QED):** Feynman et al, a relativistic quantum-mechanical gauge theory of photo-mediated electromagnetic interactions. 1952
- Quantum entanglement:** the physical phenomenon that occurs when a pair or group of particles is generated, interact, or share spatial proximity in a way such that the quantum state of each particle of the pair or group can't be described independently of the state of the others, even when the particles are far apart. "Spooky action at a distance"

Quantum Field Theory (Q.T.). a theoretical framework that combines field theory and the principle of relativity with ideas behind quantum mechanics. Q.T. is used in particle physics to construct physical models of subatomic particles. In condensed matter physics Q.T. is used to construct models of quasi-particles. The current standard model of particle physics is based on Q.T. Quantum field theory results from **combining classical field theory, quantum mechanics, and special relativity.** The earliest successful classical field theory is one that emerged from Newton's law of universal gravitation, despite that "fields" aren't mentioned in *Principia*. The force of gravity as described by Isaac Newton is an "action at a distance"—its effects on faraway objects are instantaneous, no matter the distance. (Wikipedia)

Quantum fluctuations: Mukhanov theorized they could have caused large structures in space. 1981

Quantum leap: In Bohr's model of an atom, when an electron goes from one fixed orbit of electrons to an orbit of electrons of a higher or lower energy. (The closer to the nucleus, the lower the energy that orbit has). 1913

Quantum mechanics: Heisenberg, Schroedinger, Dirac. For Feynman, the central principle of quantum mechanics was "the probability of an event that can happen several different ways is the absolute square of a sum of complex contributions, one from each alternate way." 1926-7-Heisenberg- -Bohr, 1930-Dirac, 1952-Feynman, 1986-quantum loop gravity, 1987-Hawking, 2012-Krauss

Quantum theory: theory that energy can only be absorbed or radiated in discrete amounts, or quanta. All particles are subject to quantum theory, a theory in which objects do not have single definite histories. Hawking: Quantum Theory is "the greatest achievement in theoretical physics in the 20th century." p. 1, 335 BC-Aristotle, 1273- Aquinas, 1900-Planck, 1905-Einstein, 1927-Bohr, 1939-Pauling

Quark: an elementary particle with a fractional electric charge. discovered by Murray Gell- Mann and George Zweig in 1964. See atom, p. 449.

Quasar: high luminosity core of a galaxy, or particle emitted by a black hole, or star that emits large amounts of energy. p. 436-7

Qur'an: / Koran, Islam's Scriptures.

Thabit ibn Qurra: astronomer, mathematician, 850

R

Ra: Egyptian Sun god, created the universe.

2400 BC Rabelais, Francois: monk, writer. p. 416

Racism: The belief that groups of humans possess different behavioral traits corresponding to physical appearance and can be divided based on the superiority of one race over another. Stephanie

Pappas summarized a 22 year study in the UK of low intelligence people, "There's no gentle way to put it. People who give in to racism and prejudice may simply just be dumb." The story is told that one day George Jessel took Lena Horne, a beautiful Black singer, to the Stork Club, which did not admit Negroes as customers. The Maitre'd was uneasy and tried to find some excuse to refuse them admittance. He asked, icily, "Who made your reservation?" Jessel said, "Abraham Lincoln."

Radiation: 1. transfer of heat between bodies without a change in the temperature of the intervening medium, 2. any release of energy from its source. c.1847-heat transfer, 1899-Rutherford 1900, 1905- Einstein, 1924-de Broglie, 1926-quantum mechanics, 1948-cosmic microwave background (CMB), 1964-CMB, 1992-Variations in CMB radio astronomy (the study of radio waves space). 1933-Eddington, 1961, pp. 425, 4'8, '30-1, 435-7, '46, '50, '57, '62, '69, /74, 500, '04

Radio waves: the lowest known energy waves of the electromagnetic spectrum. 1895, 1933-Eddington, pp. 428, 430-2, 436, 463

Radioactivity: the spontaneous release of energy from atomic nuclei, 1896-Curie, 1899-Rutherford, 1934-Szilard, 1950-weak nuclear force

Railroad(s): p. 1, 1776, 1800, '48, '69

Rand, Ayn: objectivist (extreme libertarian), Selfishness is good. 1957, '61, '74.

von Ranke, Leopold: 1833

Rationalism: Reason is the fundamental source of knowledge and that truths can be reached through reason without experience . (Empiricism, on the other hand is the acquisition of knowledge primarily through our sense facilities, experience. Both views are atheistic.) AD 30-Greek, 550-Roman, 1190-Maimonides, 1509-Erasmus, 1633-Descartes, 1700, 1739-Hume, 1755-Kant, 1781-Kant, 1846-Kierkegaard, 1865-Lecky, 1885-Leo 13

Ratzinger, Cardinal / Pope Benedict 16: 1937, '66

al-Rawandi, Ibn: Islamic Mysticism. c.870

Rawls, John, transformed political philosophy, A

Theory of Justice argued that justice was fairness. A just society would distribute responsibility, work, hardship, and wealth fairly. 1971

Raymond: Count, French protector of Cathars. 1208

al-Din al-Razi: physician, prominent atheist. The universe has more than a thousand thousand worlds. *The Large Comprehensive, Prophets' Fraudulent Tricks; The Stratagem of Those who Claim to be Prophets, and On the Refutation of Revealed Religion*. 910, 1180, 1532, 1687

Reade, W W: Scot, philosopher. 1872

Reagan, Ronald: US president 1981-89. After visiting Latin America, said, "You'd be surprised. They're all

individual countries down there.” 1532, 1933
Realism: originally meant that universals, concepts like "red" were the only real things, now, the opposite. 387 BC-Plato, 1000, 1121-Abelard, 1273-Aquinas

Realpolitik: politics without illusions. 1532

Reason: the use of logic, as distinguished from rationalism. But G B Shaw, “The man who listens to reason is lost. Reason enslaves those whose minds are not strong enough to master her.” Voltaire: When people undertake to reason, all is lost.

Reconciliation of Opposites: Nicolas of Kues said that the Earth might be orbiting the Sun. 1444

Redshift: Sunlight is the small portion of the electromagnetic spectrum visible to the human eye. It is made up of innumerable colors merging seamlessly from those that appear to humans as blue to red. The shortest visible wave lengths appear as blue wave lengths, they get longer through the colors of a rainbow to the longest, which appear red. Redshift is the optical phenomenon that the light from a light source (such as star or a galaxy) receding from the viewer (Earth) appears redder as the light waves are stretched out, i.e., less waves per second reach the viewer (Earth), to a lower frequency, i.e., the red end of Sunlight’s visible wave spectrum. Conversely light frequencies from a star or galaxy approaching Earth (There are a few, like the Andromeda galaxy) are bunched up and appear bluer (blueshift). 1842-Doppler, 1912-Slipher, 1917-Slipher, 1929-Hubble

Reductionism: a philosophical position that a complex system is just the sum of its parts, and that an account of it can be reduced to accounts of individual constituents. This broad position can be applied to objects, phenomena, explanation theories, and meanings. Reductionism strongly reflects a certain perspective. Religious reductionism attempts to explain religion by analyzing it to certain nonreligious causes.

In science, reductionism implies that certain fields of study are based on areas that study smaller organizational units.

In philosophy: The concept of downward causation poses an alternative to reductionism. Some philosophers explore ways in which one can talk about phenomena at a larger-scale of organization exerting causal influence on a smaller- scale level, and find that some, but not all proposed types of downward causation are compatible with science. particular, they find that constraint is one way which downward causation can operate. In particular, they find that constraint has also been explored as a way to shed light on scientific concepts such as self- organization, natural selection, adaption and control1..

The Reformation: a/k/a The Protestant Revolt, the religious and political movement that started with Martin Luther in 1517 wherein various Roman Christian clergy disagreed with certain dogma and got fed up with the corruption of the Roman Church (selling indulgences) and started new Christian sects (which grew and became religions). The rebelling clergy generally wanted a religion more focused on their reading of the *Bible* without the intermediary of the Vatican. They were supported by civil rulers (kings and princes) who disdained theological issues but more importantly wanted to avoid Papal taxes and still feign Christian piety to their subjects. 1376, 1509-Erasmus, 1517-Luther, 1536-Calvin, 1545- *Council of Trent*, 1560-Knox, 1572-St Bartholomew’s Day Massacre, 1659

Refraction: the deflection of a wave as it passes from one medium to another, e.g., through a lens (air to curved glass), or from air to water. 1307, 1690-Huygens, 1855

Refractive index: the ratio between the speed of light / electromagnetic waves in a vacuum and thru a substance. Light goes thru glass or optical cables 2/3 as fast as through space, a vacuum.

Refrigeration: cooling something based on the fact that an expanding gas consumes energy, so its temperature drops. 1852

Regula Monachorum: Rules written by St. Benedict for monastic life, detailed. still widely used. 520

Reimann, Bernard: non-Euclidean geometry. 1915

Reincarnation: The belief that after one dies, one comes back to life in another body or a different species. 2000 BC-Hindus, 528 BC-Buddhism, AD 45, 644

Reis, Phillip: German, telephone. 1861, p. 427, 429

Reis, Piri: Ottoman map maker. 1513

Reiss, Adam, in 1998 discovered the universe’s expansion was accelerating faster than its calculated mass would indicate. Its unknown and undetected cause was called Dark Energy. 2011 Physics Nobel. p. 437

Relativity: the relative values of time, motion, mass, and energy of a body in motion. Special relativity is the observable effects of a body in motion. As velocity nears the speed of electromagnetic waves/light, time slows down, mass increases, and lengths contract. p. 1, 335 BC-Aristotle, 1632-Galileo, 1664-Descartes, 1826-Lobachevsky, 1886-Mach, 1905, ‘07, ‘15, ‘18, ‘27, 1962-Einstein, 1986, ‘87-Hawking, 2012-Krauss

Religion: has several meanings. As used herein, it is an institution with a set of beliefs (Dogma) whose adherents believe in a supernatural power(s) over the universe and man’s destiny and is worthy of worship and obedience.

Richard Dawkins: "Many atheists believed that

- belief in a religion was harmless nonsense. 9/11 disposed of that."
- Ralph Waldo Emerson:** "Religions we call false were once considered true."
- Ambrose Bierce:** A daughter of hope and fear, explaining to Ignorance the nature of the unknowable.
- Remus:** in myth, killed by brother Romulus. 753 BC
- Renan, Ernest:** French, *The Life of Jesus*, Jesus was good but not divine, "The simplest schoolboy is now familiar with facts for which Archimedes would have sacrificed his life." 1863, '82
- Republic:** representative government. 509 BC, 449 BC-Rome, 150 BC, 65 BC-Cicero, 43 BC-Roman, 1397-Venice, 1531-Machiavelli, 1751-Hume, 1776-Paine,
- Republic, The:** Plato, utopian authoritarian society. 1300 BC, 387 BC, 335 BC
- De Republique:** Jean Bodin, Political Theory, 1586
- Republic of Letters:** spread scientific ideas. 1660
- Republican (political) Party.** 1870-freethought,
- Rerum Novarum:** Leo 13, condemned socialism, advocated a "just wage," and said that women's place is in the home. 1891
- Resistance:** (electrical) opposition to current flow in a conductor
- Reuchlin:** Johann, German humanist. 1515
- Revolution, Political, Cultural:** 30K BC, 425 BC-Socrates, 1414-Hus, 1532-Machiavelli, 1688-Glorious revolution, 1733-French, 1755-Johnson, 1776-American, 1776-industrial, 1789-French, 1790-Burke, 1793-Paine, 1793-French, 1800-Overview, 1820s-Jacksonian, 1848-Marx, 1881-Bakunin, 1883-Ranke, 1911-Mexican Revolution, 1532-Machiavelli, 1633-Descartes, 1633-Galileo, 1650, 1697, 1779-Madison, 1918-relativity
- Revolution, Scientific:** 1596, 1687-Newton, 1905-Einstein, 1962-Kuhn
- De Revolutionibus:** Copernicus: 1536, 1543, 1616-put on *Index*, 1759-Catholics may read it.
- Revivification of the Sciences of Religion:** al-Ghazili, 1090
- Reymond, Robert:** Calvinist theologian, *Justification of Knowledge* (1984) said believers should not try to prove God exists by arguments but should accept the content of revelation by faith. 1988
- Rhaeticus, Georg:** printed *Naratio prima*, a summary statement of Copernicus's theories. 1540
- Ricardo, David:** *On the Principles of Political Economy and Taxation.*, 1817
- Riccioli, Giovanni:** physicist. *New Almagest*. 1651
- Richard 2:** king, betrayed and killed John Ball. 1381
- Richelieu, Cardinal:** (1585-1642), French, 1532
- Richer, Jean,** French astronomer. 1672
- Richter, Benjamin:** German, proposed the *law of definite proportions*, led to reviving atomic theory. 1792
- Ridley, Mark:** Brit, zoologist. 1973
- The Rights of Man:** 1791, Thomas Paine. 1791
- The Rise of the West:** When the West out-gunned, out-thought, out-explored, and dominated most of the world, 1500+.
- Ritter, Johann and Michelson:** electrolysis. 1800
- Robertson, Howard:** redshifts of galaxies. 1928
- Robertson, William:** Scot, took Kames's four stages of history and applied it to the history of Europe; thus creating the modern study of history. 1759
- Robertson, Pat:** politician, professional TV Christian, had a history of extreme statements. He said Hinduism is a cult, that being Gay is a sickness, that one need not be nice to Episcopalians, Presbyterians, or Methodists as they reflect "the spirit of the Antichrist", that God caused the Haiti earthquake of 2010 (220,000 died), as Haitians (the slaves) had in 1793 made a pact WITH the Devil to gain their freedom from the French. 2001
- de Robespierre, Maximillian:** leader of, then victim of, the French Revolution, 1624-deism. 1789, 1793
- de La Rochefoucauld, Francois:** Hypocrisy is the homage that vice pays to virtue.
- Roemer, Ole:** speed of light is finite. 1676
- Roentgen, Wilhelm:** X-rays. Awarded first Nobel prize in Physics 1901. 1895, '97, p. 431
- Romagnosi, Gian:** (1761-86), Italian, first to say electricity and magnetism are related. 1802
- Roman Catholic Church:** largest Christian religion, the Western remnant of Christianity after early Christian sects like Gnostics were expelled or destroyed and after Christianity split with Eastern Orthodox, and, in the 16th century that part of Roman Christianity left after Protestant religions were founded and took converts. The US Conference of Catholic Bishops commissioned a study that in 2004 found that 4,500 priests (4% of priests) were the subject of 11,000 allegations of sexual abuse, 25% of victims were under 11, another 50% under 16, 80% male. Higher clergy covered up the offenses. Other countries had equivalent stories. Catholicism's war against "modernity" is extensively documented in John J McGreevy's *Catholicism: A Global History from the French Revolution to Pope Francis*. Many mentions herein.
- Roman / Holy Inquisition:** see Inquisitions, this Index, 1184, 1229, 1233-4, 1317, 1440, 1500, 1525, 1560, 1600-Bruno, 1614-Galileo, 1616-Vanini, 1633-Galileo, 1820s-Bolivar, 1887-Romanticism, Rousseau, 1762 1800
- Romulus:** in myth, killed his brother Remus and founded Rome. c753 BC
- Roosevelt, Eleanor,** Franklin's wife. 1942
- Roosevelt, Franklin Delano:** U S president. 1936, '38-39, '41, '44, p.416

Roosevelt, Theodore: president, "No one is above the law." (Richard Nixon, "When the President does it, that means it is not illegal.") Roosevelt was falsely credited by the Hearst newspapers with leading a calvary charge of "Rough Riders" up San Juan Hill in the Spanish American War. His regiment's horses were then in Florida. He and his men played a minor role in the battle.

Rose, Ernestine: (1810-92), freethinker and orator.

Rosmini, Antonio: Prime Minister of the Papal states, critic of clergy, *The Five Wounds of the Church*, It was put on the *Index*. Rosmini was fired, 1848

Ross, Lee David: psychologist, fundamental attribution error, We tend to attribute someone's else's action to character and our own actions to external factors beyond our control.

Rougemont: Swiss theologian, anti-Darwinism. 1863

Rousseau, Jean Jacques: romantic, *Discourse on the Sources of Inequality of Mankind*, *The Social Contract*. 1586-social contract, 1624-deism, 1751-*Enlightenment*, 1754, 1758-contrary 1762

Rowe, William: the *Evidential Problem of Evil*, 1979

Royal Society of Edinburgh: formally founded in 1783

Royal Society, The: of London, for Improving natural knowledge, commonly known as the Royal Society, formally founded in 1660 by 12 intellectuals to promote scientific study. 1660, 1665-6-Hooke, 1673-Leeuwenhoek, 1684, 1686-7-Newton, 1768-Priestley, 1836-Darwin, 1855-Huxley, 1855-Hooker, 1880-Pearson

Royall, Anne Newport, a crusading feminist. pioneering travel writer, political journalist, and newspaper publisher, 1828

Rubin, Vera: astronomer, inferred dark matter when the rotation of galaxies was faster than expected. 1970s, p. 436

Rubric, the heading of a chapter or section of a book. A descriptive heading of title. A direction for the conducting of a divine service inserted in liturgical books

Rue, Loyal: Christian philosopher. 2006

von Rumford: Count, see Benjamin Thompson

Runyon, Damon: "All life is six to five against." 1912

Rushdie, Salman: author. Ayatollah Khomeini ordered him killed wherever he may be found. "*The Satanic Verses*" "From the beginning, men used God to justify the unjustifiable." 1989, pp. 418, 469

Ruskin, John: "What is really desired, under the name of riches, is essentially power over men." (1855)

Russell, Bertrand: "From childhood upwards, everything is done to make the minds of men and women conventional and sterile." "Few people can be happy unless they hate some other person, nation, or creed." *Problems of Philosophy, A History of Western Philosophy*, orbiting teapot. 30K BC-origin of religions, 540 BC-math, 387 BC-Plato,

1273-Aquinas, 1600, 1670-Spinoza, 1687-The *Enlightenment*, 1762-Hume, 1781-Kant, 1907-Bergson, 1912-All faiths do harm-Whitehead, 1922-Wittgenstein, 1927-agnostic, 1929, 1950-religions are based on fear.

Rusticello da Pisa: Marco Polo's adventures. 1292

Rutherford, Ernest; first person to describe the structure of an atom, in 1911. An atom has a tiny dense nucleus of positive protons with negative charged electrons orbiting around the nucleus. His and Bohr's models of the atom have been superseded by quantum mechanics. 1897, 1899-two kinds of radiation, 1906, 1911-model of an atom, 1913-Bohr changed the model, 1919-he made oxygen from nitrogen, 1921, 1931, 1932-Chadwick. In 1937, he had a hernia. As a baron, a *titled* doctor was required to operate. The delay cost his life.

S

Saadia Gaon, prominent Rabbi: Suffering is a gift from God as it leads to an eternal afterlife in Heaven c.910

Sabellians: early Christian sect. AD 321

Sacrament: religious rite that confers divine grace on the practitioner

Sagan, Carl: astronomer, atheist, estimated the universe contains 100 trillion trillion stars" 1812, 1973, 1980, 1995, pp. 435, 441, 468

Sagoyewatha / Red Jacket: Seneca Indian chief p. 414

Sahl, Mort: (1927-2021), philosopher, father of modern comedy. "This matter of two sides to every question is bad logic and bad practice; sometimes there are no sides; sometimes there are a hundred Liberals feel unworthy of their possessions. . . . Conservatives feel they deserve everything they stole." p. 423

Said, Edward W: "*Orientalism*," re the West's superior opinion over the societies and cultures of "The East," stemming from its imperialist past. 1978

St. Bartholomew's Day Massacre: French child king Charles 9 ordered the mass killing of Protestants / Huguenots c.1752. 1759-Voltaire, 1887-Acton

Saladin / Salah al-Din: captured Jerusalem. 1187

Salam, Abdus: physicist. 1968

Salvation: avoidance of Hell upon death. The *raison d'être* of Christianity. It promises a wonderful life after death if one obeys in this life..

Sand, George: pen name of Amantine Lucile Dupin, Baroness Dudevant, mistress of Frederick Chopin, 1750. p. 416-*The Index*

Sanser, Emmanuel: 2013

Sanskrit: Indian Script, related to Greek. 400 BC

Santayana, George: Those who cannot remember the past are condemned to repeat it. 1905

Sapir, Edward: The very structure of one's

language influences how one thinks. 1938

Sapolsky, Robert, American polymath, influential determinist, pp.199, 400, 443

Sargon 1: early Semitic king, his birth myth resembles that of Moses. c.586 BC

Sarton, George: *Introduction to the History of Science* 1927

Sartre, Jean Paul: existentialist, "Man is condemned to be free." "[My grandmother's] skepticism kept her from becoming an atheist." 1943, p. 418

Saul of Tarsus a/k/a Saint Paul. See Paul

Saving lie: concept described by Henrik Ibsen, a lie one tells oneself to raise one's self-esteem. A common phenomenon. 1881

Savonarola, Girolamo: ruled Florence, purist, "bonfire of the vanities." c.1494

von Schelling, Frederick: German, c.1799 started a new form of philosophy, *Naturphilosophie*. It had its day and faded.

Schilling, Pavel: Baron, telegraph, 1846, p. 426

von Schiller, Johann Christof Friedrich, with Herder and Goethe, sought to establish a new humanism by synthesizing Romantic, *Enlightenment*, and classical ideas. Weimar Classicism. "With stupidity, the gods themselves struggle in vain." 1772, 1933, p. 423

Schleiden, Matthias: *Cell Theory*. 1855

Schlesinger, Arthur, Jr.: "Clarity in language depends on clarity in thought." p. 468

Schmidt, Maartin: measured galaxies spectra, 1963

von Schoenberg, Nikolaus Cardinal: 1536

von Schoenborn, Christoph: Cardinal, Vienna. 2005

Scholastic School / Scholasticism: the philosophy of the medieval theologians; in general, the divorce of speculation from observation and practice The attempt to apply Aristotelean principles to Christian dogma. Widely used 1000-1600. 1000, 1076-Anselm, 1085-Adelard, 1150, 1209, as developed it 1397-humanists ridiculed it, 1500, 1509-Erasmus, 1515-ridiculed, 1517-criticized, 1589-Galileo ridiculed it, 1600 and 1620-Bacon criticized it, 1685- *Enlightenment* dissed it, 1688-taught at Oxford and Cambridge, 1690-Hume

Schopenhauer, Arthur: philosopher, 40,000 BC, 335 BC, 1532, 1638, 1751, '81, 1819, '44, '80-Dostoevski, pp. 400, 406, 409, 447, 477

Schrödinger, Erwin: quantum mechanics. 1925-7

Schuman, Frederick L: *International Politics; force, fraud, favors*. He predicted the precise date that Hitler would invade Bohemia and Moravia. 400, 1532. 1750, 1939, pp 396, 442

Schwabe, Heinrich: sunspots have regular cycles. 1843

Schwann, Theodor: cell theory. 1855

Schwarzschild, Karl: idea of black holes. 1916

Schweitzer, Albert: Alsatian, doctor, philosopher, organist, *Out of my Life and Thought*. 1933

Science: known as natural philosophy until the 1600s.

1. The search for the rules / laws that connect and govern all phenomena, Methods of discovering natural laws. Or
2. A collection of propositions, natural laws. They describe what will happen as energy is transformed and matter is moved or changed in various ways. They apply over a wide range of time and space. Such laws together form a vast Body of laws fitting onto a consistent set.

Definitions of Science:

Henri Poincaré: Science is built on facts, like a house is built of bricks: but an accumulation of facts is no more a science than a pile of bricks is a house.

Edward O Wilson: The organized systematic enterprise that gathers knowledge about the world and condenses it into testable laws and principles. The diagnostic features of science that distinguish it from pseudoscience are its repeatability, its economy, third, its measurement, fourth, its heuristics, and last, its consilience.

Empirical science, an area of science dealing with observation and experiment, as distinguished from formal science, which consists of logic and mathematics.

Empirical science contains physical science, like physics and chemistry, and deals with the structure of matter and the nature of energy. Natural science includes biology, astronomy, and geometry (all subjects that deal with past matters as well as present matters).

Social sciences include economics, anthropology, psychology, political science.

Luther Burbank: "Science is knowledge arranged and classified according to truth, facts, and the general laws of nature."

Einstein, "Science is nothing more than the of everyday thinking."

Science in Islam: flourished only in limited subjects c.800 to c.1200, between Greek thought and modern science.

Scientific Method: procedures to verify scientific hypotheses. In the West, developed over the ages by many scientists / natural philosophers. Herbert Feigl, a scientist's criteria of the Scientific Method:

1. Intersubjective testability.
2. Reliability, or a sufficient degree of confirmation.
3. Definiteness and precision.
4. Coherence or systematic structure.
5. Comprehensiveness or scope of knowledge.

Scientism: belief that only science can explain natural

- phenomena.
- Scopes, John: biology teacher, convicted for breaking a Tennessee law banning teaching evolution. 1925
- Scott, Walter, Sir: The first "nobles" were the most successful soldiers / killers. He invented the historical novel. 550, 1805
- Scottish Enlightenment: did not consider the church an enemy, unlike the French *Enlightenment*, many mentions herein. 1650-1780
- Scruton, Roger: philosophy seeks only truth. 1920
- Scurvy: cured by citrus or sauerkraut. 1757, '68
- Seagull, Eric: legal scholar, 1980s
- Second Continental Congress 1775. Named George Washington commander of colonists' forces. 1776-adopted the *Declaration of Independence*
- Second Ecumenical Council. AD 381
- Second law of thermodynamics, Clausius 1850: some energy is lost dissipating into space in converting heat to work; it's called entropy. 1824, '50, '75, pp. 413, 425
- Seeger, Pete: American folk singer, pacifist, (Partial lyrics) Where have all the flowers gone, long time passing? Young girls have picked them everyone. Oh, when will they ever learn? Where have all the soldiers gone, long time passing? Gone to graveyards, everyone. Oh, when will they ever learn? Where have all the graveyards gone, long time ago? Gone to flowers, everyone. Oh, when will they ever learn? 1955, 2009, p. 406
- Segur: Monseigneur, Swiss, anti-Darwin. 1869
- Sehoh, Scott: Skeptical theism leads to moral paralysis 1996
- Seldes, George, (1890-1995), American, one of the greatest journalists of all time. Pp 470, 480
- Seleucus: heliocentrism, the Moon causes tides. c.146 BC, 1514-Copernicus.
- Semantics: the branch of linguistics that studies the meaning of words, Joseph Conrad, "Words, as is well known, are great foes of reality." See *The Tyranny of Words*, 1938, Stuart Chase. 1938
- Semiotics, the study of signs and symbols
- Semmelweis, Ignaz: Hungarian doctor, washed his hands, Infections in his patients ceased, 1847
- Seneca the Younger: Roman, Comets follow natural laws. "What else is nature but God." "I do not obey God, I agree with him." "Who dares tell himself the truth?" AD 45, 1517, '32, '43, 1848
- Senior, Nassau: economic advisor to Queen Victoria during the Irish potato famine of 1846-48. 1847
- Serapis: Greek god, temple in Alexandria. 300 BC, AD40
- Serveto, Miguel / Michael Servetus: Spanish physician, circulation of blood. 1553
- Sermon on the Mount*: Important sermon of New Testament Christianity. *Matthew* 5-7. AD 30, AD 45, 1963
- Sextus Empiricus: 44 BC, c AD 200
- Shakespeare, William: greatest dramatist. 1589, 1600, '06
- Shang Dynasty: mysticism. c.1750 BC
- Shanks, Naill and Fail Joplin: chemists, 1996
- Shannon, Claude: his *A Mathematical Theory of Communicating* created Information Theory. The basic idea was that information could be broken down into quantifiable entities he called digits. 1948.
- Shapley, Harlow: astronomer, thought galaxies were cloudy places located in the *Milky Way* galaxy. 1914, '20, p. 434
- Al Shatir / a/k/a al-Din Abu'l Hasan Ali ibn Ibrahim ibn al-Shatir: devised a non-Ptolemaic but still geocentric model of our solar system. c.1340
- Shaw, George Bernard: Irish, playwright, 1300 BC, 1916
- Sheen, Fulton J, Catholic bishop, influential advocate for belief in a supernatural deity, had a radio and then TV show, *Life Is Worth Living*. "Because God is full of life, I imagine each morning Almighty God says to the Sun, "Do it again"; and every evening to the moon and the stars, "Do it again"; and every springtime to the daisies, "Do it again"; and every time a child is born into the world asking for a curtain call, that the heart of the God might once more ring out in the heart of the babe. 1952-57
- Shelley, Percy Bysshe: atheist, poet, "Can a man be free if woman be a slave?" 1811
- Shen Kua: Chinese polymath. 1060
- Shermer, Michael: skeptic, *The Believing brain*. 1957, 2011
- Shih Huang ti: emperor, united China, reformer. 240BC
- Shinto: Japan, a form of national patriotism, a way of purification and communion with the divinities and spirits of Japanese tradition. 500 BC, 604
- Qutb al-Din al-Shirazi: said that the Sun may be the center of orbiting planets. 1250, 1307
- Shiva the Destroyer: Hindu god. 2000 BC
- Shockley, William B, transistor. p. 433
- Al-Shuku ala Batlamyus: faulted Ptolemy's planetary system, but didn't fault geocentrism. c.1020,
- Siemens: German electric company. 1887, pp. 428-9
- Silk Road: name given in 1870 century to overland trails used for at least 1,000 years between the Mid-East and China. 1046 BC 1292, 1437, '52
- Silver, Brian: Israeli chemist, explained GR. 1915
- Simony, the selling of a church office, such as a bishopric, a ministry, a pastorate, or performing a religious duty, like officiating over a baptism, a wedding, a burial, or some other benefit like causing lessor time in purgatory for a dead person, or selling a consecrated item. 591, 1059, 1377.

Sinclair, Upton: incisive social critic, muckraker, wrote 100+ books from 1896-1976, well known for *The Jungle*, *The Profits of Religion*, *A World to Win*, *Oil*, and *Boston*. 1906, 1918

Singer, Peter: utilitarian philosopher, ethicist, "If one can do great good, one must." 1979

El-Sisi: president of Egypt, on Islam's folly, "Departing from the text of the *Qur'an* has now impossible. It is antagonizing the entire world. Is it possible that 1.6 billion [Muslims] should want to kill the rest of the world so they may live?" 2015

Sistine Chapel: painted by Michelangelo. 1512

Sixtus 4: Pope, authorized Spanish Inquisition.

Skeptic / Skepticism: doubt regarding certainty of knowledge, such as the existence of God. In its extreme form, view that one cannot know anything. 2000 BC-Hindu, 470 BC-Sophists, 387 BC-Plato, 334 BC-Pyrrho, 300 BC-Epicurus, 150 BC-Carneades, 65 BC-Cicero, AD 77-Pliny, 178

The Skeptical Chymist: Robert Boyle. 1661, 1663

Skeptical Theism: We should be skeptical of our ability to understand why God permits evil and suffering and therefore we should have no reasonable basis to accept *the Problem of Suffering*. 1990s

Slavery: ownership of humans by other humans. Considered legitimate from day one into the 18th century by all cultures (and the 10th *Commandment*) and into the 20th century by a few backward countries.. P. 1, 9000 00 BC, 5000 BC, 2000 BC, 1750 BC-Hammurabi, 1300 BC-Jews, 594 BC-Solon, 586 BC- Semitism OK's it, 510 BC, 508 BC-Athens, 500 BC, 490 BC-Persia, 435 BC-Pericles, 425 BC-Socrates, 335 BC-Aristotle, 300BC-Greeks, 150 BC- Romans, AD 45-St. Paul, AD 200- *New Testament*, 400-Chrysostom, 413-Augustine, 450-Dark Ages, 600-Isidore-slavery is due to Original Sin, 24-Mohammed, 630-Shi'ites, 683-13th Council, 872-al-Rawandi, 1000-England, 1202-Crusades, 1273-Aquinas, 1490-slave trade, 1452-Nicolas 5, 1492-Vatican, 1497-America, 1500, 1516-Thomas More, 1519- Americas, 1532-Force, 1543-Paul, 1543-Luther: Enslave Jews, 1563-slave trade, 1565, 1600, '07, '50- America, '86-*Enlightenment*, -'89-Locke, 1754-Rousseau, '61-Otis, '65-America, 1776-Paine, 1777-Scotland, 1785-Islam, 1787-*US Constitution*, 1788-Kant, 1789-America and France, 1793-Paine, 1800s-banning slavery, 1830-Mormons, 1833-England freed its slaves, 1839-*Tanzimat*, 1840-Carlyle, 1840-Proudhon, 1845-Stirner, 1848-Marx 1854-*Bible*, 1857-Dred Scott 1859, 1863-John Stuart Mill, 1863-Emancipation, 1865- 13th Amendment, 1866-Pius9 OK'ed slavery, 1881-Bakunin, 1882-3-Nietzsche, 1913-Washington, 1947-Nehru, 1962-Saudi Arabia,

Slipher, Vesto: saw the redshift of spiral nebulae, but did not then realize that they were galaxies apart from the *Milky Way*. 1912-redshift. 1917

Small god problem: AD 363-Julian, 1795-Paine, pp. 414, 472, 481

Smarts, the combination of intelligence and knowledge

Smith, Adam: *An Inquiry into the Nature and Causes of the Wealth of Nations*-1776. 1624-deism, 1751-Scotland, 1776, 1800, 1867-Marx

Smith, Charles: AAAA, atheist. 1928

Smith, George: deduced that Greek and Sanskrit were related, found *Gilgamesh* in the British Museum on clay tablets and translated it. 1872

Smith, Joseph: founded Mormonism. 1827, dictated *Book of Mormon*, polygamist, 1827, 1830

Smith, William: father of English geology. 1815

Snow, C P: *The Two Cultures*, science vs. arts. 1959

Snow, John: doctor, cholera transmitted in water. 1854

Social Contract: Pleasant but false concept legitimizing government and liberties. 1586-Bodin originated it, 1609-Althusius, 1651-Hobbes, 1670-Spinoza, 1689-Locke, 1754 and 1762-Rousseau, 1586-Hume-the concept had no historical basis, 1882-3-Nietzsche, 1900-H G Wells ridiculed it.

Social Darwinism: socio-political movement, based on Darwin's Natural Selection / survival of the fittest. It was misleadingly used to justify social and economic inequality. 1871, 1975

Socialism: an economic and social system based on the communal ownership of the means of production and distribution. 1820s, 1835-Tocqueville, 1881-Bakunin, 1934-Spengler

Society of Christian Philosophers, 1978, page 199, page 407.

Society of Friends (Quakers): founded c.1647, repudiates violence and oath swearing, worships without ministers or liturgy. Quakers teach an "Inner Light" of divine revelation. 1765, 1854.

Sociobiology: the biology of human behavior, popularized by Edward Wilson. Human behavior is the result of Man's evolutionary history, wrote *Sociobiology, the New Synthesis*. 1975

Sociology: The study of social institutions and processes. 1532, 1830-Compte, '35, '57, '70s, 1905, '64, 2000

Socrates: foremost Greek philosopher, "follow the evidence," "The highest wisdom is separating good from evil." p. 1, 1300 BC-golden rule, 530 BC-Confucius, 450 BC, 425 BC-ethics, 399 BC- trial, 387 BC-Plato continued his teaching, 335 BC-Aristotle, AD 30, 1273-Aquinas, 1763, 1875

Soddy, Frederick: physicist, 1902, '13

Sol Invictus/Unconquered Sun: pagan Roman god. 321

Solon: Roman lawgiver, cancelled land debts.
 Moderated Draco's harsh laws. 594 BC, 449 BC
 Solvay Conference of 1927: Brussels, most eminent met to discuss quantum theory. 1927
 Solzhenitsyn, Alexander: "The line dividing good and evil cuts through the heart of every human being. And is willing to destroy a piece of his own heart?" 1956
 Sophism / Sophist: concerned only with the of argument, even to use false arguments. 470 BC, 50 BC, 425 BC-Socrates, 387 BC-Plato
 Sophocles: second great Greek tragedian, When gods do ill, why should we worship them? 470 BC
 Sosigenes: astronomer in Alexandria. 50 BC
 de Soto, Hernando: explored S.E. North America. 1539
 Souter, David: Supreme Court Justice, p. 374
 Space, as in "outer space: " 590 BC, 1577-Brahe, 1609- Kepler, 1637-Descartes, 1664, 1687-Newton 1781- Kant, 1860-Einstein on Clerk-Maxwell, 1879-Light, 1880-Pearson, 1886-Mach, 1900-Lorentz, 1905, 1915-relativity, 1916-black holes, 1918-Eddington, 1919-Einstein, 1927-Quantum, 1932-Oort, 1961-Big Bang, 2012-Krauss,
 Space-time: the concept introduced by Einstein to indicate that Newton's concepts of space and time are not separate. Space-time is the only absolute quantity that belongs to events. 1905-Einstein, 1912-Russell, 1915-Einstein, p. 435
 Spanish Inquisition: Torquemada. 1184, 1478
 Speciation: separation of groups of organisms by their ability to interbreed. All cows and dogs can interbreed, so all cows or dogs are one species.
 Spee, Frederick: Jesuit, criminologist. 1631, '70
 Spence, Thomas: Sottish land reformer. 1774-75
 Spencer, Herbert, evolutionist, *Progress, its Law and Cause*. He coined the phrase "survival of the fittest," to describe Darwin's *Natural Selection*. Darwin liked it and adopted it in his 1869 edition of *Origin of Species*. 1852, '57, '59, 62, '64, '62, '70s, 1907, p. 401
 Spencer, Richard" American neo-Nazi, anti-Semitic, Activist for white supremacists, explained Donald Trump's appeal, "What's most important about Trump is the emotion. He's awakened a sense of "us," a sense of nationalism about white people He's done more to awaken that nationalism than anyone in my lifetime. I love the man." p. 403
 Sprenger, Jacob: Dominican monk, wrote a theological justification to torture "possible" witches in inquisitions. 1484
 Spengler, Oswald: German, political theorist ,1919, '33
 de Spinoza, Baruch: pantheist, *Theological- Political Treatise, On Human Bondage*, "Religion is organized superstition." 1300 BC, 387 BC, 300 BC- *Problem of Evil*, 400, 1076-Ontological, 1532, 1600-Bruno, 1633-Descartes, 1670-sensible mystic, 1686, 1719, 1808-Goethe, p. 418-the *Index*
 Spiritual, no consensus as to its meaning
 Sporkin, Stanley: Federal Judge, presiding over Lincoln S and L Ass'n v. Wall, 1990, a large white collar fraud case. Critical of the criminal executives enablers, the outside accountants and lawyers who advised the executives.
 Sproul, R C: prominent American Presbyterian minister, "As long as we bear the guilt of sin, we cannot protest that God is unjust in allowing us to suffer."
 de Stael, Anne Louise Germaine: p. 418-the *Index*
 Stalin, Joseph: Soviet communist dictator, had all relevant writings mentioning him to be rewritten to glorify him. 1940, p. 418
Standard Model of Cosmology: 2014, p. 437
Standard Model of Particle Physics: Noether's Theorem was a basic tool constructing it. 1974,
 Standing Bear, Chief Luther: 1933
 Stanhope, Philip Dormer: Earl of Chesterfield, 1850, "History is only a confused heap of facts." "People hate those who make them feel their own inferiority."
 Stanley, Arthur: Anglican Dean of Westminster. The *Bible* is twisted [by theologians] to make it sound reasonable. 1875
 Stanton, Elizabeth Cady: suffragist, "Every form of religion that has breathed up on this earth has degraded women." (1885), 1896
Starry Messenger: Galileo. 1613
 State sovereignty: Grotius. 1586- Bodin, 1609-Althusius, 1625-Grotius, 1750-balance of power
 Statue of Liberty: "Give me your poor, your tired. 1886
Steady State (static) Model of the Universe, proposed experimentally and observationally c.1948. It had its day but the *Big Bang* model proved to explain phenomena better. 1948, '50, '53, '64, '92
 Steam engine: AD 50-Hero, 1765-Watt, 1852-balloon
 von Stein, Charlotte: Goethe's muse, (1751),
 Steinbeck, John: writer, *Grapes of Wrath* (Revelation 14:17-20), *The Winter of Our Discontent*. 1929, '39
 Stendhal /Marie-Henri Beyle: writer, realist, "God's only excuse is that he does not exist." 40K BC, p. 418
 Stenger, Victor: physicist, philosopher, *The Fallacy of Fine Tuning, Fine Tuning and the Multiverse. Skeptic mag.*, vol.19, no.3. Science flies you to the moon. Religion flies you into buildings." 1973, pp. 409, 418, 443
 Steno, Nicolas: geologist, superposition. 1671
 Stephen 3: Pope, forged *Donation of Constantine* used to obtain the Papal States from Pepin. 753

Stephen, Leslie: ex-Anglican priest, *Essays on Freethinking and Plain Speaking*. 1872

Sterne, Laurence: Brit, *Tristram Shandy*. p. 416

Stevenson, Adlai: presidential candidate. My definition of a free society is a society where it is safe to be unpopular." (1952). 1751, 1963

Stevin, Simon: Hydrostatic Paradox, invented a land yacht, introduced decimal fractions to the Wes observed that large and small objects fell to Earth at the same rate. 1585, '90

Stewart, Balfour: witness to the Bishop Wilberforce-Thomas Huxley encounter re Darwinism, 1860

Stirner, Max: German, God is dead. 1845. 1883-Nietzsche said it later

Stoic / Stoicism: philosophy taught by Zeno, characterized by indifference to pleasure or pain, The whole universe is a manifestation of God. 335 BC-Aristotle, 300-BC Zeno, 150 BC, 58 BC-Lucretius, 44 BC-Cicero, AD 77-Pliny, AD 65-120-Epictetus, AD 150-Marcion, AD 161-Marcus Aurelius, 413-free will, 529-Rome

Stress: measure of the force acting on an object.

String theory: an attempt to create a unified field, theory in 4 dimensional space-time, where the particles of particle physics are replaced by one-dimensional objects called strings. A central premise is that strings vibrate in a 10 or 11 dimensional universe. Hawking and other astrophysicists say it is a good candidate for a theory of everything, There is no known experiment that can verify or refute it. 2010

Structuralism: a philosophical and methodological outlook that divides our perception into binary categories, light / dark, good/bad, and analyzes the structures that lie behind things.

Structure of the Human Body: Andreas Vesalinas. 1543

Strunk, William, Jr.: *Elements of Style*, "Omit needless words. Use the active voice." 1920

Stupidity: Don't confuse stupidity with ignorance.

Stupidity means one has difficulty in or is very slow at learning. Ignorance means absence of knowledge generally or with regard to a particular situation. One can be intelligent overall but ignorant of relevant facts for a particular field of knowledge. A smart person *probably* knows more facts about a particular situation than a not smart person but not necessarily. The world is full of average intelligent persons who have learned more relevant facts regarding a particular situation than a smart person who simply hasn't taken the trouble to learn the relevant facts. The world is run on knowledge, not intelligence.

The Industrial Revolution was run by persons

who knew relevant facts, not by nobles who got a degree from Cambridge or Oxford simply because they were nobility.

Eric Voegelin, political philosopher, "Stupidity doesn't mean unintelligent, it is loss of reality."

Garret Keizer, "Stupidity is everywhere we look." "Profoundly professing a total inability to understand an opponent's position on a controversial issue "

A libertarian said, "Without all this government interference, I'd be free." The professor replied, "My friend, what you would be is food."

Dietrich Bonhoefer, "Stupidity is "a more dangerous enemy of the good than malice." *Harpers Mag*. 2021.

Pew poll, 2021. 14% of Americans agreed that "The government, media, and Wall Street are controlled by Satan-worshipping pedophiles who run a global child-sex-trafficking operation.

Ernest Renan. Religion is a necessary imposture.

Even the most obvious ways of throwing dust in people's eyes cannot be neglected when you are dealing with a race as stupid as the human species." See also "fools", this Index

Sturgeon, William: invented the electromagnet in 1825. p. 425

Sublimation: change of a substance from a solid to a gas without first becoming a liquid. The reverse is deposition

Subjection of Women, On the: John Stuart Mill. its co-author was his partner and wife, Harriet Taylor. 1869

Suez Canal: opened, made the world smaller. 1869

Suffragists: advocates of voting for women. 1920.

al Sufi, Abd al-Rahman: astronomer, c.964 saw a fuzzy cloud in the *Andromeda* constellation.

Sui Wen Ti, Chinese emperor. 589

Sulzberger, Arthur Hays, publisher, *NY Times*, 1948

Sumer/Sumerian, first Western civilization. 8000 BC, 5000 BC-first civilization, 3700-first wheeled cart, 3000 BC-cities, 2700 BC-Botany, 2200 BC, 2000 BC Gilgamesh. 850 BC-alphabet

Summa Theologica. Thomas Aquinas. 1273

Sunday, Billy, popular Christian revival speaker, violently anti-Darwin, used skills at his revivals to encourage "sinners" to repent. 1908

Sunspots Letters, Galileo. 1611

Superconductivity, certain metals lose electrical resistance at close to absolute zero. In 1992, Japanese said they made a material that achieved it at minus 103 Celsius.

Supplementary angles, two angles that add to 180 degrees, Supernatural forces and beliefs: cannot be measured, observed, or recorded by any objective natural procedures. Thus are inconsistent

with natural laws. If such a force impacts the world, it could be measured and tested like any idea.

Supernova, explosion of a star resulting from the collapse and rebound explosion of a high mass star after nuclear fusion has depleted in the star's nuclear core. 1572-Brahe, 1609-Kepler.

Superposition, of geologic strata: younger strata are above older strata, seen by Nicolas Steno. 1671

Superstition, Voltaire: any practice or form of worship to which we are not accustomed. The only God is the God of our priests. 300 BC, ad50, AD-150, 450, 1532, 1624, '70, '77, 1700, '62', 64, 1776, '78, '84, '90, 1801, '26, '70-72, '70-1910, 1890, 1901, '04, '16, '25, '48, '50, '58, '88, '98, pp 402, 423.

Surya Siddhanta, Hindu text, A year is 365.25636 days, 1.4 seconds off current thinking. p. 433

Swedenborg, Emanuel, astronomer, first to the nebular hypothesis of star and planet formation. 1734, '55, '99

Swift, Jonathan, Anglican priest, satirist, *Gulliver's Travels, A Modest Proposal*. 1726

Swinburne, Richard, Anglican philosopher, 1991

Syllabus of Errors, A compendium of ideas favoring reason, issued by Pope Pius 9. He condemned the ideas. 1864

Sylvester, Pope. 753

St. Sylvester, Order of. A Papal order. See James, Constantin, this Index. 1877

Sylvius, Aeneas / Pope Pius 2. 1430

Symbolic logic, Russell, Whitehead, Peano c.1912

Le Systeme de la nature, an atheistic book by Baron d'Holbach. 1770

Szilard, Leo, Hungarian-American physicist, chain reaction, atomic bomb. 1934

T

Tabitha, reputed died and resurrected. 1864

Tabor, James D, author. AD 96

Tabula Rasa / blank slate, concept of the mind at birth, taught by Aristotle, Aquinas, and Locke. 1633, 1689-Locke, 1758-Helvetius, 1781-Kant, 1975

Tait, Peter, with William Thomson published *Treatise on natural philosophy* in 1867. 1867, 1906

Tambora, Indonesia, volcano erupted, famine. 1815

Tamerlane, Timur-u-Lang: Mongol chief. 1200

Taney, Roger: Supreme Court chief Justice, wrote the *Dred Scott decision*, slaves are property. 1857

Tansley, Arthur: coined "ecosystem". 1935

Tanzimat: movement to reform and modernize Islam, confined mostly to Turkey. 1839, '62, '86

Tao / the Way: Lao-Tsu. 350 BC

Taylor, Frank Bursley: plate tectonics. 1911

Taylor, Harriet: advocate for women's rights, partner then wife of John Stuart Mill. According to Mill, she

was the co-author of most of his philosophical writings. 1859, '69

Tawney, Richard: The true character of a social philosophy is how it treats those who fall by the way. 1926

Taxonomy, that department of science or of a particular science or subject which consists in or relates to classification

Tegmark, Max: quantum physicist. Physics is the ultimate intellectual adventure, the quest to understand the deepest mysteries of the universe.

Telegraph: (1832, '35, '37), '39-*Tanzimat*, 1846-Thomson, 1861, '66, '77, '88, pp. 402, 426-30, 456, 488, 504

Teleology: theory that *purpose is the basic impetus for plants and animals* in the universe; all things have a purpose, Greek telos = goal. Aristotle and others, basis of the *Teleological / Design Argument*

Telescope: 600 BC-Thales, 1020-al-Haytham, 1267-*Opus Majus*, 1608-patented, 1609-10-Galileo, 1656-Huygens, 1663-reflecting telescope designed, 1666-Newton, 1785-Herschel, 1924- 100 inch telescope, 1929-galaxies, 1933-radio telescope, pp. 402, 432, 436-7, 473, 477, 484

Telephone: 1831, '61, '71, 1962, pp. 426-7, 429, 432, 450, 488, 503

Templeton Effect, the: p. 404

Tempier, Etienne, Bishop of Paris: *Condemnations of 1270 and 1277*, prohibitions on studying specific ideas, to halt the influence of rational thinking inconsistent with Christian theology. 1270, '77

Ten Commandments, Moses. c.1300 BC

Terrorism: Daniel Pipes, "a form of asymmetrical warfare by non-state actors against state actors and their innocent noncombatant civilians. It functions by evoking terror.

Terrorist: Peter Joseph, founder of the Zeitgeist movement, The true terrorists of our world do not meet at the docks at midnight or scream "Allahu Akbar" before some violent action. The true terrorists of our world wear \$5,000 suits and work in the highest positions of finance, government, and business.

Tertullian: early Christian theologian: 200, 405

Tesla, Nicola: physicist, developed alternating current (AC), a system for transmitting an electric current far better than Edison's direct current. He was dishonestly hounded by Edison. 1883, '90, '95, pp. 430-1

Tetrapod: When creatures with four rudimentary legs first left oceans for land around 375 M BC. 2000

Tetzel, Johann: sold indulgences for Leo 10. 1516-7

Thales: first eminent Greek natural philosopher, asked, "Is anything permanent?"

Thales's Theorem re right triangles. He founded Greek geometry, 620 BC, 600 BC-big question, 590 BC, 540 BC-Pythagoras, 504 BC- 450 BC, 430 BC-Democritus, 387 BC-Plato

Thales's Theorem: Any triangle in a circle touching the circle whose hypotenuse is the diameter is a right triangle. 600 BC.

Theism: belief that God created and is the supreme authority in the universe.

Theist: a believer in a personal God

Theistic Evolution / Guided Evolution: Evolution is a fact, but God guides it. 2013 Pew poll: 24% of Americans believe this.

Theocracy: rule by clerics. 787, 1150-Medieval,

Theodicy: word coined by Leibniz, a justification for God's permitting evils and sufferings in the world. Meant to overcome *The Problem of Suffering*. 300 BC, 1710-Leibniz, 1751, 1779-Hume, 1788-Kant, 1974-Plantinga, 1982-Mackie, 1990s-Skeptical

Theism

Theodore of Gaza: translated Aristotle's *Botany* into Latin. 1483

Theodoric of Freiburg: analyzed rainbows. 1307

Theodoric: leader of Ostrogoths. 475

Theodosius: made Christianity Rome's official religion, as important as Paul in promoting Christianity. 395

Theological-Political Treatise: Spinoza, 1670

Theology / theological: the effort to explain and defend the beliefs of a religion, or of a god. Christian theology largely seeks to reconcile the *Bible* with the world. Voltaire, "A science profound, supernatural, and divine which teaches us to reason on that which we don't understand and to get our ideas mixed up with that which we do. Thus it is evident that it is the noblest and most valuable science there is, all the others confining themselves to the known and consequently despicable objects."

Theophylact: Count, corrupt, controlled papacy. 896

Theophrastus: student of Aristotle, examined and classified over 500 species of plants. 335 BC

Theorem: Any proposition which is demonstrated in terms of other more basic propositions.

Theory of the Leisure Class: Conspicuous Consumption, Thorstein Veblen. 1899

Themis: The Greek god of divine or natural law, order, and justice. Her name means justice. She was also credited with wisdom, foresight, and prophecy She knew secret mysteries unknown even to Zeus. She protected the oppressed.

Thermochemistry: Germain Henri Hess. 1840

Thermodynamics: the science of heat, the laws of the interconversion of energy and work. 1687, 1824-Carnot, 1840-Hess, 1842-Meyer, 1846-Thomson,

1847-Laws of, 1875- Gibbs, 1877- *Second Law of Thermodynamics*, 1906, 1914, pp. 424-433-*Electromagnetism Timeline*

Thermometer: 1000-Avicenna, 1592-Galileo, 1687-measuring devices, 1717-Fahrenheit

Thesis, antithesis, synthesis: Hegel. 1820s

Thinking: Cicero: To think is to live

Einstein: connecting phenomena coherently

Luther Burbank, "The greatest torture for most people is to think."

Henry Ford, Thinking is probably the hardest work there is, which is the probable reason why so few engage in it.

James Thurber: 60 minutes of thinking of any kind is bound to lead to confusion and unhappiness.

Eugene Ionesco: It isn't what people think that is but why they think what they think.

Henri Amiel: Action and faith enslave thought both of them not to be inconvenienced or troubled by reflection, criticism, or doubt.

H G Bohn: Thinking is far from knowing.

Buckminster Fuller: People should think things out fresh, and not just accept. . . the conventional way of doing things.

Jose Marti "Man's first duty is to think for himself"

Winston Churchill, on Anthony Eden, "Tony doesn't think, he associates."

Andrew Shulman: Learning science comes in two forms: Learning in the context of preexisting paradigms, (knowledge enrichment), and learning that requires adopting new paradigms (conceptual change, which requires a basic restructuring of one's intuitive.

Nehru: Most of us seldom take the trouble to think. It is a troublesome and fatiguing process and often leads to uncomfortable conclusions.

Ralph Waldo Emerson: What is the hardest thing to do in the world, to think. So far as a man thinks, he is free.

Amos Tversky: Theories order knowledge and allow for better predictions, until a better theory is found.

Bertrand Russell, "Most people would sooner `die than think. In fact, they do so."

Third Ecumenical Council: affirmed Mary's divinity. 1618-48 Catholic vs. Protestant, AD 1431,1648

Thomas a Kempis: *Imitation of Christ*. "The humble knowledge of thyself is a surer way to God than the deepest search after science." "It is much safer to obey than to rule." 1428

Thompson, Benjamin: became Bavarian *Reichsgraf* / Count von Rumford. Heat is internal to an object, not a fluid called caloric. 1798, 1824

Thomson, Anderson and Clare Aukfor's: *Why We*

- Believe, A Concise Guide to the Science of Faith*, describes how the brain is through evolution receptive to belief in a supernatural entity. 2011
- Thomson, John Joseph: discovered electrons. 1897
- Thomson, William /Lord Kelvin: 1843, '46, '51, '53, '67, '77' 92, 1906, pp. 426, 429,
- Thought, basic laws of*: Aristotle. 335 BC, 1160, 1748, 1751, 1819, 1905
- The Three Truths*: Pierre Charron, prominent French priest, a defense of the Church. 1601
- Thucydides: Greek historian, 410 BC
- Thus Said Zarathustra*: Frederick Nietzsche. 1883
- Tillich, Paul: p. 420
- Tindal, Matthew: England's most influential deist, *Christianity as Old as the Creation*. 1730
- de Tocqueville, Alexis: *Democracy in America*. 1831, 35
- Todd, Henry Albert: a migrant farm laborer
- Tokogawa Shogunate: isolated Japan in 1628
- Toleration: Essay Concerning*: (except for Catholics and atheists): Locke. 1689
- Tolsani, Giovanni: argued against heliocentrism. 1546
- Tolstoy, Leo: Count, "When a man is unable to understand a thing, he ridicules it." "Three things I hate, autocracy, orthodoxy, and militarism." wrote *War and Peace*, 1869. "Patriotism is slavery." 1532
- Tombaugh, Clyde: discovered Pluto. 1930, p. 436
- Tommaso da Modena: Italian painter. 1350s
- Tomocharis: astronomer at Alexandria: 300 BC
- Torah, The*: law, *Hebrew Bible*, c.586 BC, AD 30, 1765-Puritans, 1820s-reform Semitism
- Torque: the tendency of a body to rotate under an applied force
- de Torquemada, Tomas: Inquisitor General of the Spanish Inquisition, Confessor for Queen Isabella. 1478, 1492
- Toscanelli, Pablo: Florentine map maker: regaled Columbus with tales of riches in the East. 1492
- Towneley, Richard: physicist, gasses. 1666
- Toynbee, Arnold: "The space program is morally indefensible when [men go hungry and homeless]." "A Study of History. AD 377, 410, 1377, 1750, 1919, pp. 408-Rome, 442, 494
- Tragical History of Dr. Faustus*: Thomas Carlyle. 1663
- Transcendental / transcendentalism: relating to a spiritual realm: beyond the realm and reach of the senses. Also, exalted character, thought, or language. Also, that which is extravagant, vague, or visionary in philosophy or language. 550s-Christian Church, 862-Neo-Platonism, 1755-Kant, 1835-R W Emerson
- Treasury of Optics*: al-Haytham. 1020
- Treatise of Human Nature, Being an Attempt to Introduce the Experimental Method of Reasoning into Moral Subjects*: David Hume. 1739, 1789-
- Bentham
- Treatise on Electricity and Magnetism*: James Clerk -Maxwell. 1855, '73, p.429
- Treatise on Light*: Huygens. 1690
- Treatise on Man and the Formation of the Fetus*: Descartes, published posthumously. 1664
- Treatises on Civil Government*, John Locke. 1689
- Trevelyan, Sir Charles, Brit, administrator of relief efforts for Ireland during the 1846-48 potato famine, 1847
- Treviranus, Gottfried: evolutionist. 1802
- Trigonometry: mathematics of triangles. 2200 BC, 600 BC-Thales, 450 BC-Pythagoras, c.1040-al-Jayyani -spherical trigonometry, 1202-Fibonacci, 1430-overview, 1466-Peuerbach, 1637-Descartes
- Tritium: a hydrogen isotope of 1 proton and 2 neutrons.
- Trotsky, Leon: exiled Russian revolutionary, in 1924 said, "Not believing in force is like not believing in -gravity." (1932) "The dictatorship of the Communist Party is maintained by recourse to every form of violence."1940
- Truman, Harry: U S President, "Democracy is based on the conviction that man has the moral and intellectual capacity, as well as the inalienable right to govern himself with reason pp. 400, 403, 423, 439, 486, 490, 508
- Truth: John Dewey: What happens to an idea when it is verified by reality.
- Tryon, Edward, Universe may be a random quantum function, so could have evolved from nothing. 1973
- Ts'ai Lin: Confucian, invented paper. AD 105
- Tuchman, Barbara: Books are the carriers of civilization. . . Books are humanity in print.
- Turing, Alan: Brit, code-breaker genius, WW2. 1950
- Tutu, Desmond: S. African Anglican archbishop, 1800
- Tversky, Amos: *Prospect theory* (in economics.) 1979
- Tversky and Daniel Kahnemann, Israeli psychologists, in the past generation, upended the fields of psychology and economics. 1975, '78, '80, p.399
- Tu Wei-Ming: Confucian scholar. 530 BC
- Twain, Mark: (river boat expression for two fathoms, a safe depth for river boats), pen name of Samuel Clemens, most famous American author, river boat pilot, philosopher. "Of all the animals, man is the only one that is cruel. He is the only one that inflicts pain for the pleasure of doing it. It is a trait that is not known to the higher animals." "Clothes make the man. Naked people have little or no influence in society." "When in doubt, tell the truth." 624-deism, 1830-*Book of Mormon*, 1847, 70, 1957, 1980, pp. 403, 411, 415, 422, 456, 466
- The Two Cultures*: Scientists and humanities scholars don't study or understand each other. CP Snow. 1959

Tyndale, William: translated the *Bible* into English, so Henry 8 killed him, *King James Version* scholars later used his translation. 1524, 1611

The Tyranny of Words: 1933, Stuart Chase. 1938. 1950
Tyron, Edward: 1973

Tyson, Neil deGrasse: *Astrophysics for People in a Hurry*, 1914, '33, '97, 2015-6, pp. 405, 442

U

Umar / Omar: Islam's 2nd caliph (successor). 642

Unam Sanctum: Pope Boniface 8's Bull. Decreed that belief in the pope's sovereignty over all humans was necessary to be saved from Hell. 1302

Uncertainty (indeterminacy) Principle, "It is impossible to simultaneously measure the position and the momentum of atomic particles with an arbitrary degree of accuracy." because at present the only way to see an atomic particle is to hit it with something that deflects it, Heisenberg. 1927

Underachiever Problem of the Design / Teleological Argument: (and Problem of Suffering) Russell, "The world is so full of evil, cruelty, and suffering that it could not have been created by a competent or loving god." 1779-Hume

Unified field theory: holy grail of theoretical physicists. 1933, '50

Uniformitarianism: geologic processes continue slowly. Lyell, 1830

Unitarian Universalist: religious philosophy" All religions are true and all deserve respect.

Universal Declaration of Rights of Man: French Revolution. 1789

Universals. The medieval problem of universals is a logical, and historical, continuation of the ancient problem generated by Plato's (428–348 B.C.E.) theory answering such a bundle of questions namely, his theory of Ideas or Forms.

A Universe from Nothing, Why There is Something Rather Than Nothing: Lawrence Krauss. 2012

Universe may be expanding: first suggested by Alexander Friedmann, Russian. 1922

Unknown Purpose Defense to Problem of Suffering, akin to *Skeptical Theology*: a "human's limited ability" argument, and a Leibniz theodicy. 1710

Upanishads, Hindu scriptures adding to the Vedas.

Urban 2: Pope, *Pax Ecclesiae*, don't make war near churches. 1096

Urban 6: one of two simultaneous popes. 1378

Urban 8: Pope, persecuted Galileo. 1492-slavery, 1610, '24, '33-Galileo

Ussher, James: God created the world in 4004 BC on October 23, at 9:30 AM. 1650

Usury: in Semitism and Christianity, charging interest for a loan was a sin. It became inconvenient for

wealthy Christians. So Christian clergy changed it just to charging *high* interest, 586 BC, AD 325, 1139, '79, 1290, 1536-Calvin

Uthman / Othman: third caliph, finalized Mohammed's hadith. 644, 896

Utilitarian / utilitarianism: The measure of moral value is the greatest good for the greatest number. 335 BC-Aristotle, 1758-Helvetius, 1789-Bentham 1859, '63-John Stuart Mill, 1979-Peter Singer

Utopia, Thomas More. 1516. Other utopian books: , Johannes Andreae 1619, Tommaso Campanella 1623, Francis Bacon 1627, James Harrington 1656, Francois Fenelon 1699, Louis-Sebastien Mercier 1770, Thomas Spence 1803, and Etienne Cabot 1840.

V

Valla, Lorenzo: confirmed Nicholas of Keus's proof that the *Donation of Constantine* was a forgery. 1444, pp. 416, 436

Valence: the concept that atoms have the capacity to combine with other atoms. Edward Frankland, 1852

Validity, a property of arguments. An argument is valid if its conclusion results necessarily from its premises, no more, not true, just valid.

Valtorta, Maria: *Poem of the Man-God*. p. 416

Van Gogh, Vincent, painted 200 paintings, over sketches, sold none. After death became one of the most popular and famous painters

Van Til, Cornelius: founded a school of called Presuppositional apologetics. c.1928

van der Bilt, Cornelius: railroad robber baron. 1873

Vanderbilt, William H: son of van der Bilt, American capitalist, 1882

Vanini, Lucilio: *Dialogues Concerning Nature*, 1619, 1633-Galileo. 1719, p. 418-the *Index*

Vasa, Gustav: Swedish king, took all Church lands 1527

Vasari: painter of St. Barthelme Massacre, 1572

Veblen, Thorstein: American economist, *Theory of the Leisure Class*, *Conspicuous Consumption*, 1776-Adam Smith

Velocity: in physics, speed in a specific direction.

Venus of Laussel: small oldest known cave carving, depicts a fat woman, possibly a goddess. 20K BC

Verne, Jules, S. *Journey to the Center of the Earth* Science, my boy, is made up of mistakes, but they, are mistakes which it is useful to make, because they lead little by little to the truth."

Versalis, Andreas: *Structure of the Human Body*. 1543

Vespucci, Amerigo: the New World is not Asia. 1502

Vestiges of the Natural History of Creation: Robert Chambers. 1844, '55

- Villiers, George: Duke of Buckingham , “The world is made up, for the most part, of fools or knaves, both irreconcilable foes to truth.”
- da Vinci, Leonardo: inventor, scientist, greatest genius. “Nature never breaks her own laws, Experience never errs. Necessity is the mistress and guardian of nature.” *Mona Lisa*. 1506- *Last Supper*, 1490-1, 1500, 1624, 39
- Vygotsky, Lev: “We [can only] think in concepts and words we know.”
- Vindication of Natural Society*: Edmund Burke. 1756
- Vindication of the Rights of Women*: Mary Wollstonecraft. 1792
- Virchow, Rudolph: cellular pathology. 1858
- Virgil: Roman epic poet. *The Aeneid*, 25 BC- *Aeneid*, 200-*Bible*, 1339-Plutarch
- Virginia Declaration of Rights*: precursor to *US Bill of Rights*, George Mason. 1776, 1789-
- Vishnu the Preserver: Hindu god. 2000 BC
- Visigoths: barbarians, sacked Rome. AD374, 410
- Vitalism: the doctrine that life is the basic reality, of which everything else is a form or manifestation.
- de Vitoria, Francisco: 300 BC-Evil, 1536-a Just war.
- Vivekananda, Raja-Yoga: Swami, “Was there ever a more horrible blasphemy than the statement that all the knowledge of God is confined to this or that book? How dare men call God infinite, and yet try to compress Him within the covers of a little book!”
- Vohs, Kathleen and Jonathan Schooler: 2002
- Volta, Allesandro: first battery. 1799, pp. 424, 426
- Voltaire: *Lettres Philosophique*, *Historie Universelle*, *Candide*, supreme debunker of nonsense. “God in his goodness takes away reason from those he intends to save or render useful to the Church. . . Every sensible man, every honorable man, must hold the Christian sect in horror.” “The best is the enemy of the good.” p.1, 814-HRE, 1532-Use of fraud to rule, 1624-deism, 1670-Jesuit education and 1670- Spinoza, 1697-Bayle, 1710-Leibniz, 1726-29-his life and exile in England, 1734-38-*Letters Philosophique*, 1735-Chatelet, 1736-Frederick 2, 1751-free will, 1751-72-Diderot’s *Encyclopedie*, 1753-*Historie universelle*, 1755-Lisbon, 1759-*Candide* and his quotes, 1762-criticized Christianity, 1764-*Philosophical Dictionary*, 1766- *Philosophy of History*, 1789-France, 1796-de Maistre, 1916-Shaw quotes, 1918-Sinclair, pp. 398, 468, 477-8, 485, 496
- Voyages of Discovery: c.1450-1550
- de Vries, Hugo: *Intracellular Pangenesis*, random genetic mutations create new species and other changes in an organism. 1899
- Vulgate Bible*: St. Jerome, Official Roman Catholic *Bible*, in Latin. AD 382
- Vygotsky, Lev: Russian psychologist. Man learns to think based on the concepts he knows; inner speech is different from one’s outer speech.1936
- ## W
- van der Waals, Johann/Johannes: Dutch, refined the PVT law of gasses, 1666
- Wahhabism: male-supremacist authoritarian Muslim Sunni sect. It dominates Saudi Arabian culture and gov’t. 1740
- Wallace, Alfred Russel: self-taught biologist, evolution . In the 1850s he independently developed the theory of natural selection but did not have the mass of evidence that Darwin had. He became a champion of *Darwinism*. 1844, ‘55, ‘57, ‘59, ‘62, ‘71
- Wallis, John: conservation of momentum. 1670, ‘87, *Law of motion*
- Wang Ch’ung: Chinese philosopher. AD 100
- Warfare of Science With Theology in Christendom*: by Andrew Dickson White. 1896
- Warhol, Andy: Art is what you can get away with.
- al-Warraq: Muslim, criticized the concept of God who orders his slave (Man) to do impossible things and then punishes him for not doing them. c.870
- Warren, Earl: Governor of California, Chief Justice of the US Supreme Court. 1954
- Warren, Rick: American Evangelical Christian pastor. “God is the only source of hope that’ll never disappoint. When we place our faith in him, he provides joy, peace, and hope that overflows.”
- Washington, George: president. 1624-deism, 1755, 1776-Valley Forge, 1789-President, 1913-Beard
- Wasps, The*: Aristophanes. 422 BC
- Wat Tyler’s Rebellion: Peasants revolt. 1381
- Watson, James: and others discovered DNA. 1953
- Watson, John B: American, Behaviorism. 1912
- Watson, William: static electricity. 1747
- Watt, James: perfected Newcomen steam engine. 1765
- Watt: measure of rate of transfer of energy. 1847
- Wave mechanics: de Broglie. 1924, 1926-7
- Wave theory of light*: Huygens. 1690-Huygens, 1746-Euler, 1808-interference, 1846-Thomson, 1900-Planck, 1905-photoelectric effect
- The Way*: Lao Tse / Lao Tzu. 350 BC
- Weak force/beta decay / radioactivity: Marie Curie. 1896
- Wealth of Nations, Inquiry into the Nature and Causes of the*: 1776-Adam Smith, 1867-Marx, 1899-Veblen
- Weber, Max: sociologist, economist. c.1904
- Webster, Daniel: Senator. 1830
- Webster, Noah: *Dictionary*, 1783, 1806, ‘28
- Wegener, Alfred: plate tectonics. 1911, 1944
- Weight: measure of gravitational attractive force depends on the masses of objects involved.
- Weinberg, Steven: physicist, weak nuclear force and

- electromagnetic force are essentially identical, so there are only 3 basic forces. 1847, 1968, p. 421
Weiner, Eric, 2018
Weisberger, Andrea: refuted Plantinga, 1995, 2019
Wells, H G: historian, *Outline of History* 1920. "The past is but the beginning of a beginning and all that is and has been is but the twilight of the dawn. 3700 BC, 300 BC, 410-fall of Rome, 1202-Crusades, 1902-social contract, 1937, '43, '47, pp. 299, 419, 423, 442.
Wells, William: Scot, doctor, first to describe concept of natural selection. 1818
Welsh, Joseph: a Boston lawyer, destroyed the odious Sen. Joseph McCarthy, a Red-baiting thug, when he asked, "Have you no sense of decency, sir, at long last? Have you left no sense of decency?"
Welton, James: basic laws of thought. 1905
Wesley, John and Charles: founded Methodism. 1750
Weyer, Johann, *On the Magic of Demons* criticized witch hunts, said evidence from torture was useless. 1563
Weyl, Hermann: in 1923 published a book that noted the redshift-distance correlation that in 1929 became known as *Hubble's Law*. 1929
What is a Nation? Ernest Renan. 1882
Wheatstone, Charles, and William Cooke: built a telegraph before Samuel Morse. pp. 427-8
Whistler, James Abbott: painter. c.1683
White, Andrew Dickson: *The Warfare of Science with Theology in Christendom* 1896, "The cardinal doctrine of a fanatic's creed is that his enemies are the enemies of God." 1896
Whitehead, Alfred North: philosopher, logical positivism, mathematician, process theology. "We think in generalities. We live in detail." p. 1, AD 60-90, 1912-Symbolic logic pp. 442, 464, 479, 497, 500, 505, 510
Whitman, Walt: American poet (1819-1892)
Whorf, Benjamin, (with Ed Sapir) semanticist, the structure of one's language influences one's thinking. 1938

"Why" versus "How": "Why" asks "for what reason or purpose?" "How" asks "by what means or method?" Von Leibniz asked, "Why is there something rather than nothing? A scientist would ask, "How is there something rather than nothing?" 1686, 1714, pp. 398, 417
Why There is Something Rather than Nothing: Lawrence Krauss . 2012
Wilberforce, Samuel: Bishop of Oxford, anti-Darwin, in Huxley's "ape or bishop" encounter. 1860
Wiechart, Emil: 1897
Wilczek, Frank: astrophysicist, "Nothingness" is physically unstable. 2009
Wilde, Oscar Fingal O'Flahertie Wills: philosopher, wit, "There is no sin except stupidity. Seriousness is the only refuge of the shallow. The truth is rarely pure and never simple. A thing is not necessarily true because a man dies for it. All great ideas are dangerous. Consistency is the last refuge of the unimaginative. Conscience and cowardice are really the same. Only the shallow know themselves. Truth, in matters of religion, is simply the opinion that that has survived. I am not young enough to know everything. Science is the record of dead religions."
Wilkins, Maurice: co-discovered DNA. 1953
William of Normandy: conquered English army at Hastings in 1066, took over England. 1066
William of Orange: assumed the English throne in "Glorious Revolution" of 1688.
Williams, Roger: Puritan minister, advocate of religious freedom, separation of Church and state, and an early abolitionist, founded Rhode Island as a refuge from Puritanism. 1636
Wilson, Edward Osborne: See also Sociobiology, *this Index. The Diversity of Life, The New Synthesis*. 1975, '98, 2000, '06, '15
Wilson, Robert: Bell Labs, found CMB. 1964
Wirtz, Carl: astronomer, in 1921 noted the redshift-distance correlation that became known as *Hubble's Law*. 1928
Witches / witchcraft: The ability to do harm by supernatural means. 900 BC-New Testament, 413-Augustine, 1054, 1150-belief in witches widespread, 1184-Inquisitions, 1200, 1317, 1437-Inquisitions, 1484-torture for accused witches, 1517-Luther, 1609-Kepler's mother, 1631-Spee, 1641, 1765-Puritans, 1800-overview
Wittgenstein, Ludwig: influential philosopher, logical positivism, plain language philosophy, 1920s, '22, '36, pp. 415, 484, 496
Woehler, Frederick: synthesized urea, 1828
Wollstonecraft, Mary: wrote *A Vindication of the Rights of Man* in 1790 to reply to Burke's *Reflections on the French Revolution*. In 1792, She wrote, *A Vindication of the Rights of Women*. Women are systematically degraded by receiving the trivial attentions which men think it manly to pay to the sex, when in fact, men are insultingly supporting their own superiority . . . I do not wish [women] to have power over men, but over themselves." She was a powerful voice of feminism. She died giving birth at 39 in 1797.
Women, subjugation of, treated as inferior to men: *Woman* originally meant a man's wife.
Thomas Huxley, "With few exceptions, girls have been educated to be drudges, or toys, beneath men;

or a sort of angel above him.”

Jimmy Carter: “The mistreatment of women is the number one human rights abuse.”

Male advantage: “Faculties at a renowned US research institution were given two identical CVs to assess. Half the scientists considering the applicant received a CV with a female name, and half with a male name. The ‘female’ applicant was consistently rated as less competent and less hireable, and the scientists were less likely to want to mentor her. The ‘male’ candidate was offered a significantly higher starting salary. This prejudice favoring male scientists is so well known it is called *the Matilda Effect* after Matilda Gage, a suffragist. 9000 BC, 5000 BC-men owned women, 2000 BC-Hinduism, 594 BC-Greece, 500 BC, 490 BC, 435 BC-Greece, 335 BC-Aristotle, 200 BC-Cato, AD 70-Jesus, 200-*New Testament*, 392-a necessary evil, 400-Chrysostom, 413-Augustine, 624-Mohammed, 644-*Qur’an*, 675-Council of Toledo, 750-Islam, 1179-3rd Lateran Council, 1273-Aquinas, 1484-witchcraft is female, 1524-Luther, 1560-John Knox, 1620-Puritans, 1625-Grotius, 1670-Spinoza, 1686-*The Enlightenment*, 1689-Locke, 1762-Rousseau, 1765-America, 1776-Abigail Adams, 1776-Industrial Revolution, 1789-*US Constitution*, 1789-*US Bill of Rights*, 1792-Wollstonecraft, 1799-Napoleon, 1844-Schopenhauer, 1845-Engels, 1847-Social critics-Eliot, 1863-Mill, 1876-Anthony, 1883-Nietzsche, 1896-Stanton, 1962-Saudi Arabia, 1998-Islam, 1970’s-Switzerland,

Woodard, Colin: historian, All political theories are variants of the “epic struggle between individual liberty and the common good.” 507 BC, 1788, 1921, 2016, pp. 442, 455, 478

Work: energy transferred to a system, or force times distance.

Wren, Christopher: astronomer, architect. 1684, ‘87

Wright Brothers, Orville and Wilbur: developed America’s first practical airplane by mastering the ailerons, wing controls. It was essentially a motorized glider. 1903

Wright, Frank Lloyd: architect, “I believe in God, only I spell it nature.” “The scientist has marched in and taken the place of the poet. But one day somebody will find the solution to the problems of the world and remember it will be a poet, not a scientist.”

Wright, Nicholas T: Anglican bishop. pp. 407, 471

Wright, Richard: *Native Son*, Black author. 1940

Wright, Thomas: said *The Milky Way* is shaped like a disc. He was the first to speculate that there were groups of stars beyond *the Milky Way*.

Wu-ti, Han emperor: Confucian. c.136 BC

Wycliffe, John: priest, criticized the corruption in the Church, so the Church condemned him. 405, 458 1300 BC, 1374, ‘76-Church corruption, 1389-Hus, 1398-Prague, 1408, ‘14-remains burned, 1524, 1611- King James, 1863, ‘93-Huxley, 1963-Government, pp. 405, 458

Wylie, Philip: Prolific American author and social critic, “Ignorance is not bliss; it is oblivion. Determined ignorance is the hastiest kind of oblivion.” “There are in America from 15-20 million religious fundamentalists who are dedicated to doctrines incompatible with democracy in that they insist the larger group feebly follow the trail of fire breathed by those fundamentalists. They are the most dangerous minority we have because they categorically eschew the reasoned judgments of the majority.” “Few men, indeed, are so mad that they do not know when they are doing wrong. But so avid is their pursuit of goods that wrongdoing has become an element of all they do. To protest that fact is idle. Our politics, our business — little and big, our professions, our labor, are smitten in every facet with a corruption occasioned by reckless determination to make not just a reasonable profit but all the profit that can be wrung from every enterprise. Our commonest man, emulating his superiors, forges ahead with a brick on the safety valve of his conscience. *Generation of Vipers* 1942, ‘65

X

X-Rays: an electromagnetic wave whose wave length is 1000 times shorter than those of visible light waves. Very powerful. Discovered by Roentgen in 1895.

Xenophanes: geologist, There’s a great god over all. 540 BC-monotheism, 1000-geology. 1514

Y

Yellow Peril, paranoia. Fearing persons of Japanese descent on the West Coast would help Japan in World War 2, the US imprisoned 125,000 Japanese Americans, 3/4 of whom were born in the US. The US Supreme Court upheld it, possibly based on misleading testimony by the US Government. Canada imprisoned 22,000 Japanese Canadians and treated them worse than the US did its prisoners. A unit of Japanese-American soldiers fought in the US Army and was the most decorated unit in the Army.

Yorke, James and Robert May: mathematicians, developed a model for population growth using a “logistic equation” (where results get plugged back into the equation), found that small changes in

a particular variable caused either better predictions or wildly unpredictable one. Chaos theory. 1970s
 Young, Brigham: led Mormons to Utah 1830s, He hated Blacks and Indians, 1830, '50, '57
 Young, Thomas: physicist, said, Use "energy" to refer to a quantity of mass times velocity squared. He discovered interference in light, thus confirmed Huygens theory that light travels as a wave. 1803
 ibn Yunus: Egyptian astronomer, 1000

Z

Zachary: Pope, To say the Earth is a sphere is heresy and deserves excommunication. 750
 Zantedeschi, Francesco: electric current. 1829, p. 430
 Zarathustra / Zoroaster: ethical dualism. c.600? BC, 150 BC, AD 274, 1883
 Zenger, Peter, acquitted of libel by a New York jury for truthfully criticizing the NY governor. 1735
 Zeno the Stoic, school of stoicism, 300 BC
 Zeroth: *4th law of thermodynamics*. Ralph Flower, "Two bodies in thermodynamic equilibrium with a 3rd body are in thermodynamic with each other." [have same temperature] "You could have a tie." 1935
 Zeus: principal Greek god, c.750 BC
 Zheng He: (phonetic) Chinese general / admiral, controlled the Indian Ocean trade 1405 to 1433.
 Zola, Emile: "*J'accuse*." In 1898, exposed French anti-Semitism against Captain Alfred Dreyfus. 1847
 Zoroastrianism, 10-9 century BC, 620 BC, ^00 BC, 530 BC, 146 BC, AD250
 Zoser/Djoser: pharaoh, first great pyramid, 2700 BC
 Abdal-Malik ibn Zuhr: experimental surgery. 1147
 Zwicky, Franz, astronomer, posited dark matter, ignored for decades. 1933, '70, pp. 435-6, 458
 Zwingli, Ulrich/Ulrichus Zuinglius, Swiss Protestant reformer, rejected *Original Sin*, 1519, '24, '30, p.416