Information is not knowledge. Understanding information is knowledge.  Albert Einstein

Faith has no merit where human reason supplies proof.  Bishop / Pope Gregory the Great

Nothing that 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

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

To think is to differ.  Clarence Darrow

All knowledge resolves itself into probabilities...Every statement is either 1. True or false by definition (whose denial is false), or 2. Contingent unnecessary assertions, those dependent on empirical proof (whose negations are not necessarily false), or 3. Nonsense.  David Hume

An Incomplete

History of Knowledge

The Struggle against the Priests

Thomson von Stein

There is just one good, knowledge, and one evil, ignorance.  Socrates

For knowledge, too, is itself power.  Francis Bacon

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 supposing it to be true...The fact that an opinion has been 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...All acquisition of knowledge is an enlargement of the Self.  Bertrand Russell

We do not know one millionth of one percent about anything.  Thomas Alva Edison

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

We are at the very beginning of time for the human race.  Richard Feynman

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 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.  Pope Leo 13

That pernicious and insane opinion that liberty of conscience and of worship is the right of every man.  Pope Pius 9
This history follows Mortimer Adler’s designation of both men and women with the use of masculine nouns in his categories for organizing knowledge.

This history uses the designations BC and AD to designate years before and after Jesus’ birth as they are the most widely used and understood.

**Names of real persons are in boldface.**

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

Arabic name prefixes:  bin / ibn = son of.  abu = father of.  al = the.  abd = servant of.

The Abdullah Yusuf Ali translation of the Koran / Qur’an is used herein.

The King James Bible version is used herein.  Wikipedia lists 49 versions of the Bible in English.

Quotations originally not in English often have differing translations in English.

Sources are quoted or paraphrased without attribution throughout.

**Abbreviations:**
& = and
AD = Anno Domini, year of the Lord
B= billion
BC = Before Christ
BTU = British Thermal Units
c = approximately or speed of light /electromagnetic waves.
E = energy
_GmbH_ = Gesellschaft mit beschränkter Haftung / Business with limited Liability = corporation
GR = General Relativity
HRE = Holy Roman Empire
JP = Justice of the Peace
K = thousand or kilometer or Kelvin
KE = kinetic energy
Kps = kilometers per second
m = mass
M= million.
MP = member of Parliament
mps = miles per second
OT = Old Testament
PM = Prime Minister
P= pressure
ref. = referred to previously at year____
T=temperature or trillion
V= volume
VP = Vice President
An Incomplete History of Knowledge

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Decline & Fall of Rome

Dark Ages-Europe Stagnated in Theocracy, Feudalism Islam

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NOTE: This is an incomplete history of knowledge. The table of contents is not exhaustive and only includes key events and figures.
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Problems of Contrariety, Divine Hiddenness, an unknowable God.  Faith validates any & all gods
Miracles  Why is there something?  Why not?  Clergy’s fear of wrong thinking, Index & the Inquisitions
Why Torture for God?  Problem of Evil  Greatest sin is unbelief  Original Sin was a desire for knowledge
Clergy’s opposition to dissident ideas is just protecting their turf  What do we know?  Not Much

Astronomy / Cosmology  Timeline of Knowledge and Beliefs about the Universe
Evils caused by, inspired by, or excused by a God  Faith-based Evils
Sources / Bibliography  Sources are quoted without attribution throughout
Logical Fallacies - How We Think - How we Reason - How we argue  Names and Examples
INDEX and GLOSSARY
An Incomplete History of Knowledge

Short Summary Overview

c8000 BC  Writing used only to keep records, record laws. Men knew hand weapons, boats, tools, believed in many gods.
c900 BC  *Iliad & Odyssey*, at first oral, told stories of adventure, culture, & emotions of men and gods. Gods and myths ruled.
c500 BC  1st explosion of rational non-theistic thinking, philosophy, mathematics, Greek philosophers, Thales, Pythagoras, Anaxagoras, Socrates, Plato, Aristotle (introduced logic, deduction, induction), took knowledge from the priests.
c300BC Romans, pragmatic, built on Greek culture, developed the Western world government, the Roman Empire.
cAD 450+ Roman Empire declined & fell to barbarians. Western Civilization sank into the Dark Ages, stagnation; the sum of Western knowledge actually shrank. Scholarship reverted to theological, in monasteries. Science in Islam.
c1000 Theological thinking ruled the West. Muslims advanced medicine and optics. Universities slowly were founded.
c1240s Roger Bacon taught Aristotle at U. of Paris and advocated experiment and induction (rather than deduction).
c1300 The Renaissance, Greek rational thinking, arts, philosophy, were rediscovered, first in Italy, spread very slowly.
c1454 Age of Printing began with Gutenberg's movable type system. Books became available to the middle class.
1500-now  2nd explosion of knowledge: Scientific Method was developed. Science replaced theology as the most important area of human intellectual activity. The West / Europe out-gunned, out-thought, out-paced all other civilizations.

1687+ Newton's *Principia* showed that mechanical principles rule all motion. Scientific societies spread knowledge.
1688+ Age of Revolutions, scientific, mechanical, industrial, and political. Locke, natural self-evident rights.
1815-1914 Colonialism & industry made the world a money economy. Railroads, telegram, Suez Canal shrank the world.
1859 Darwin showed that Man and all living things evolved from simple organisms. Christians fiercely resisted.

Introduction. In the first days of men's consciousness, all phenomena (rain, the Sun, comets, the movement of planets, lightning, earthquakes, the place of Earth in the Cosmos, diseases, success at hunting, fire) were ascribed to some god by shamans, sorcerers, lamas, divines, holy men, priests, rabbis, gurus, wise men (called herein "priests"), who claimed some connection with the gods. They thus had power over the common people. They told the people what the gods wanted. Believing in gods, supernaturalism, was a cultural universal. But the gods were unpredictable. So a very few persons, beginning in the sixth century BC tried to discover non-priest, predictable reasons for phenomena, what Charles Freeman calls "The Quest for Certainty." This effort was opposed, often by force and violence, by the priests who felt, correctly, that their power and authority would diminish if non-priest explanations sufficed.

Bishop of Rome/ Pope Gregory the Great (c591) admitted, "Faith has no merit where human reason supplies proof."

Knowledge builds on knowledge. So the quest for non-priest explanations for phenomena is given here chronologically. Political events are a backdrop to the quest. Voltaire & Pierre Bayle, The political history of the world is a history of "crimes and misfortunes." Edward Gibbon, "Crimes & follies & misfortunes." Robert Ingersoll, "Slavery, injustice, brutality." Bierce, an account mostly false, of events, mostly unimportant, which are brought about by rulers, mostly knaves, & soldiers, mostly fools. This history is about how a few persons, mainly Western, sought explanations for events & questions about life.

Plato posited 4 levels of certainty of thought, imagining, belief, thinking, & the most certain, knowledge, which he defined as justified (verified) true belief. That is, X is true, one believes X is true, & one is justified believing X is true. In epistemology, the study of knowledge, there are 3 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 validated knowledge.

Belief in supernatural forces has been an important if not overriding factor in the history of knowledge. So much of this history deals with such beliefs and their sponsors, the priests, who often felt threatened by new ideas. For all of history, the vast majority of all people were illiterate, ignorant, & superstitious. So, there's a distinction between what such masses believed & what the very tiny percent of thinking persons believed (intellectual history). This history attempts to summarize the more important advances in knowledge, principally Western. Some concepts like string theory, dark energy, abiogenesis, quantum electrodynamics, are so esoteric that most thinking persons have never heard of them. For most people, belief is knowledge.

There is no universal definition of knowledge. Averroës: "Knowledge is the conformity of the object and the intellect." Carlyle: it's recorded experience. Whitehead: "The history of ideas is a history of mistakes; it is also a history of the purification of conduct." Locke: "Knowledge is the perception of the connection and repugnancy of any of our ideas." Thinking men try to classify, categorize and quantify relationships between objects and phenomena. Empiricists say knowledge comes from experience. Rationalists say some knowledge is innate, from certain built-in abilities of the mind. For many, knowledge comes as revelations from a god, usually through a priest. Einstein explained what is faulty with much modern thinking, "Information is not knowledge. Understanding information is knowledge."

The spread of knowledge even among educated persons, was extremely uneven. Land travel, if done at all, was at walking speed. Some developments (i.e., tools, weapons, boats, plows, stirrups, food preparation, wheels, monotheism, paper, 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 Aztecs and Incas were unaware of each other. Farming took c5,000 years to migrate from the Mid-East to France. Pottery was made in Ecuador c3100 BC but not in neighboring Peru for c1,300 years. The communities of humans were widely dispersed and isolated from each other.
**Pre-history events**

<table>
<thead>
<tr>
<th>Event</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>c350K BC</td>
<td>Biology: The Big Bang was c13.8 billion BC. The first element was hydrogen (1 proton), then nuclear fusion fused 2 hydrogen atoms into helium &amp; later into heavier elements. 9 billion years later, c4.6B BC, Earth formed when matter coalesced around a molten iron core. About 4 billion BC, a Mars sized object collided with Earth &amp; the resultant debris coalesced into the Moon. Earth’s surface cooled &amp; solidified into plates that drifted over the softer mantle. Primitive one-celled bacteria appeared c4 billion BC. For 3 billion years the only living things on Earth were one-celled organisms.</td>
</tr>
<tr>
<td>c200K BC</td>
<td>Biology: On Earth, in oceans, multi-celled organisms began to appear, evolved into different multi-celled forms.</td>
</tr>
<tr>
<td>c1.9M BC</td>
<td>Biology: First Hominids (more man-like than ape-like), had a common ancestor with ape (biggest difference from ape, walked upright, made tools), with a primate’s opposable thumb, evolved from primates in Africa when the climate turned dry. Hominids first known to exist in Chad c7 million BC. Then Ardi in Ethiopia c4.4 million BC (bipedal on the ground, used 4 limbs in trees, brain size 1/4 of Homo sapiens). Then Lucy / Australopithecus in Ethiopia c3.3 million BC, brain size half that of Homo sapiens, but twice that of a chimp. Hominids had clothing, spears, &amp; flint knives. Remains of this period are skimpy with little certainty re the evolution of Man. Hominids did not learn much; they foraged, scavenged, &amp; used a sharpened stone for several million years. Most died before 20.</td>
</tr>
<tr>
<td>c60K BC</td>
<td>Biology: Homo sapiens evolved from Hominids in c7M BC. Man-like primates, hominids</td>
</tr>
<tr>
<td>c500K BC</td>
<td>Biology: First Hominids known to be outside Africa: in Caucasus mountains, simplest stone tools, no hand axes, no fire. 1.6M BC, Homo ergaster (S. Africa) were the first hominids with long striding legs, facilitated walking and running.</td>
</tr>
<tr>
<td>c450M BC</td>
<td>Paleolithic Age: Paleolithic (from Greek, old stone tools). Hominids used stone tools, foraged, knew medicinal plants. Homo erectus pekinensis in China; brain size 1,235cc. Hunted large animals in groups. Most important pre-historic technological advance was control of fire, to heat, cook, provide light, smell, keep predators away. Men hunted; women had infants.</td>
</tr>
<tr>
<td>c250K BC</td>
<td>Biology: Hominid settlements in China. Wooden spears used at Schoeningin, Germany. Average lifespan c20 yrs.</td>
</tr>
<tr>
<td>c200K BC</td>
<td>Biology, Homo sapiens: c200K BC, (Some scientists place them a few hundred thousand years earlier). Due to a random genetic mutation, a hominid mother in Africa had a baby with a much larger neocortex, that part of the brain involved in processing higher order cognitive functions (language, self-consciousness, ability to conceive of abstract concepts like the supernatural.). Such baby was the first Homo sapiens / Wise man. He/she was slower, weaker, smaller toothed, mostly hairless. While Homo sapiens share c97% of their DNA with chimpanzees, their neocortex is 80% of their brain but only 50% of a chimp’s brain. They created a new culture slowly over 200,000 years.</td>
</tr>
<tr>
<td>c1.1M BC</td>
<td>First Hominids known to be outside Africa: in Caucasus mountains, simplest stone tools, no hand axes, no fire. 1.6M BC, Homo ergaster (S. Africa) were the first hominids with long striding legs, facilitated walking and running.</td>
</tr>
<tr>
<td>c600M BC</td>
<td>Biology: On Earth, in oceans, multi-celled organisms began to appear, evolved into different multi-celled forms.</td>
</tr>
<tr>
<td>c530M BC</td>
<td>Biology: On Earth, in oceans, multi-celled organisms began to appear, evolved into different multi-celled forms.</td>
</tr>
<tr>
<td>c400M BC</td>
<td>Biology: On Earth, in oceans, multi-celled organisms began to appear, evolved into different multi-celled forms.</td>
</tr>
<tr>
<td>c800M BC</td>
<td>Biology: On Earth, in oceans, multi-celled organisms began to appear, evolved into different multi-celled forms.</td>
</tr>
<tr>
<td>c60M BC</td>
<td>Biology: On Earth, in oceans, multi-celled organisms began to appear, evolved into different multi-celled forms.</td>
</tr>
<tr>
<td>c50-30K BC</td>
<td>Artifacts, cave paintings, carvings from the Upper Paleolithic Age are thought to represent religious ideas.</td>
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</tbody>
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Before the dawn of civilizations, before cultures developed, humans lived in small tribes & were ruled by the most powerful person in the group, like the primates they evolved from. Also like their primate ancestors, altruism continued & developed. The leader selected his mates; led the hunt; & he led the forays 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 seized the largest club & with this weapon enforced his rule upon the other members of the tribe.” Homo sapiens made tools to make tools, used spears, sharp stones, foraged for food. They interbred with Neanderthals to a very minor degree. Cooperation within the family, then tribe, benefitted all & necessitated rules of conduct.
**Origins of religions**

Religions are organizations with particular sets of beliefs which are subsets of supernaturalism. There is no agreed-upon theory of the origins of the earliest religions, & there may well be no single answer. **Prodicus of Ceo**, Greek, a sophist: Early humans worshiped those things that kept them alive. **Democritus**, Greek: Men invented gods as they were frightened & excited by the heavens, shooting stars, lightning, etc. **Petronius**, Roman, "Fear first brought gods into the world." **Baron d'Holbach**: French-German "Ignorance & fear created the gods, & priestly impostures made them terrible." **Hume**, Scot: The first ideas of religion arose...from a concern with the events of life, & from the incessant hopes & fears which actuate the human mind...Fear of the unknown." **Bertrand Russell**: "Religion is based...mainly on fear...fear of the mysterious, fear of defeat, fear of death...The earliest religions were fertility cults." **Hobbes**: fear of invisible powers. **Stendhal**: “All religions are founded on the fear of the many and the cleverness of the few.”

**Priests**

Priests claimed to have knowledge of gods who they said controlled events. Priests didn’t know how things happened, but they likely were the most clever ones in the tribe and gave explanations anyway. Their perceived knowledge was power. As may be expected, different gods and beliefs & priests developed in different cultures around the world. Nonetheless, every statement made by every priest about the power of any god over the natural world was false. So religions were based on falsehoods & gullibility from day one. If there were just one omniscient, omnipotent God Rev. 19:6 overseeing the world and in contact with priests (as priests claimed), all religions would be the same.

How we think: The idea of deities came long before “history”. Modern neurological studies and evolutionary biology have suggested that humans were (and remain) “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 “truth.” Believing is far easier than thinking. (Schopenhauer, Man can’t think, only believe. 1819)

**Priests gave the members of the community understanding & comfort from the things they feared. They provided a coherent world view, a set of beliefs that encouraged group cohesiveness, which assisted a group’s survival. The oldest argument for a god is the God by Default argument, an argument by inference, i.e., We don’t know what caused X. But something must have. Primitive people inferred that a magical / supernatural force / god caused X.”**
Arthur C. Clarke, “Any phenomenon sufficiently beyond one’s current experience is indistinguishable from magic.”

c20K BC Paleolithic Venus of Laussel, SW France, small crude cave carving of a woman (possibly representing a goddess).

c18-c10K Magdalenian Homo sapiens: hunters of Western Europe, used harpoons, followed herds, painted sophisticated elaborate cave paintings of animals, used jewelry, lived in tipis, carved animals. Earliest evidence in South France.

c15K--10K BC Ice Age ending, Farming: Ice melted, seas rose. The Zahara-Sahara (means desert) was fertile. Some hunter/gatherers found they could grow food and use captured animals, so didn’t have to follow a herd, the largest single step in the ascent of Man toward modern society (metallurgy next, c3000 BC). A temperate climate with water available enabled the development of farming. Hunters became herders, daily seeking new pasture. Crude pottery made.

c11K BC How-to knowledge: Neolithic (New Stone) Age began. Beginnings of agriculture, use of stone tools, plants and seeds. With every development of speech, Man could intensify and develop the traditions of taboos, myths, restraints and ceremonies. Language organized consecutive thought. The ability to communicate with symbols was arguably the most important mental attribute that Man had. (Language was probably a requisite for religious thought.) Neolithic Man associated the Sun and snakes in decoration and worship and left evidence of sacrificial practices. Every food, plant, and animal now important developed during the Neolithic Age, before writing.

c9000 BC Men owned women and slaves in almost all settled societies. The concept of property long predated history. Hunter / gatherers / scavengers, unschooled in many respects, had an encyclopedic knowledge of their natural world.

Emmer wheat In the Mid-East, by a genetic mutation, a new hybrid form of wheat, Emmer, with a large full head of seeds, appeared, then another fuller seeded hybrid appeared, but it had to be planted; 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 tamed.

First known man-made structures, Gobekli Tepe: S.E. Turkey. 100s of huge cleanly cut stone pillars, in several stone rings, w bas reliefs of gazelles, snakes, foxes, boars, 1 human, a woman. No cities or burial sites. Hundreds of workers needed to bring the stones to the site. This predated pyramids and Stonehenge by 6000 years. Presumed religious.

How-to knowledge: Man became a shaper of nature, not just a predator on it. The oasis of Jericho, ten acres big, just north of the Dead Sea, based on a great spring near the Jordan, the first recorded fortified town. People ground grain, had ovens, & houses of sun-dried bricks. Towns grew along trade routes. Flax / linen an ancient crop, grown for rope & cloth was the chief textile of Europe until cotton supplanted it in the 18th century. Cotton doesn’t grow in cold climes.

How-to knowledge: Farming developed independently in at least 4 locales with different crops. 1. The Americas, corn, potatoes, beans, peppers. 2. Europe-Middle-East, field agriculture, depending on reproduction by seed, grains, esp. wheat & barley the principal crops, (Bread of differing grains was the staple diet & remained so until modern times) 3. Monsoon Asia/Pacific islands where propagation of crops by transplantation of offshoots from a parent plant, such as rice, millet, & root crops dominated, & 4. West Africa, millet & yams. Farming spread slowly & unevenly, depending on climate & ease of travel. Some remote cultures today have not yet advanced beyond crude agriculture or hunting. William O’Neill states that development of farming from hunting was perhaps the most basic of all human revolutions.

Arithmetic probably preceded writing. Primitive proto-writing, pictographs, developed in Sumer city-states in Babylon, a small kingdom in south Mesopotamia (between the Tigris & Euphrates rivers), current S E Iraq. Pictographs then simplified into symbols for syllables/sounds. Only “inventions” were primitive hunting/fishing tools (& perhaps a kiln.) Daily life: Dogs, sheep, pigs were domesticated by c8000 BC in the Mid-East, the cow (in the Mid-East & India) by c6000 BC. Cotton cloth was used in Mexico. Copper and obsidian (glassy lava) were used in Western Turkey.

Around 7000 BC, a proto-city, population c5-7,000, flourished around Catal Hoyuk in Anatolia. One of few likely matriarchal cultures. No known public or religious buildings. Many figures of men, animals, but mostly of women. Burying the dead is thought to be first evidence of belief in supernatural forces. Many murals, no writings found.

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 real property, territory. Man formed logs or stones to build shelters, a great step intellectually. Farming, even before the plow was invented produced far more food with less work, permitting the population to increase greatly providing surplus food for non-farmers.

How-to knowledge: By 6000 BC, some groups had boats, woven cloth, looms, potter’s wheels (before vehicle wheels) oil lamps, simple bows and arrows, harpoons, grindstone, ax, metal tools, copper, iron (only from meteorites), flint sickles (a great technological advance). Cultures, if not civilizations, of farmers developed in Meso-America as well as Eurasia. More food from farming enabled the world population to rise 17-fold from c8000 BC to c4000 BC. In Mexico, natives domesticated corn that led to the rise of 3 sophisticated civilizations, the Olmec, then Aztec, then Mayan.

Civilizations had shrines / temples to gods from their start. In a broad sense, the settled communities can be considered communities of obedience (with slaves) where priests / gods ruled, with a god(s) who compels obedience, as opposed
to nomadic communities which were communities of will, where the chief is more or less voluntarily followed. In communities of obedience, priests were all powerful as they communicated with the gods. They used ritual and other reinforcing devices to perpetuate their control. They ruled all aspects of Man’s existence, they instructed how to live, whom to fear and kill. Apart from how-to knowledge, myths of the tribe was the only “knowledge” passed down.

Religion and a civil ruler, king / pharaoh/ warlord were the principal means of control of the lower classes. In the beginnings of civilization, in all known cultures, they were the same person. The temple system with its priests was the nucleus and the guiding intelligence about which Mediterranean primitive civilizations grew. Temples were the repository of knowledge & tradition, on how to live one’s life & a binding force to keep the community together. This or that god commanded one to sacrifice, worship, act, according to certain rules, etc.

**c5000 BC**

How-to knowledge: “Civilizations” developed from “cultures” first in the irrigable river valleys, the Nile, Indus, Tigris - Euphrates (Sumer), Yellow, and Yangtze, 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 (including military abilities) led to social classes, a governing structure, and more formal rules for behavior and the specialization of labor, artisans and craftsmen, who developed technologies, i.e., “civilization.”

All pre-historic events were totally unknown to man, to knowledge as we know it, until the last micromoments of Earth’s existence and until the last sliver of time of *Homo sapiens’s* existence, mostly in fact until the last two centuries. Sumer, the first known “civilization”, was discovered only in the 1890s, Gobekli in 1996. The temple community organization helped Sumerians create conditions for the development of civilization, first clocks (sundials), arch, legal code.

Priests told people how to gain a god’s favor. For example, for a bountiful crop, or success at the hunt, or how to qualify for the afterlife, don’t kill your neighbor, don’t steal, etc. They may well have known that what they were saying had no supernatural basis but that it was needed to keep order & control of the group. Priests’ commands were often simply common sense rules that kept peace, but with the added authority of a supernatural being who could punish the disobedient. Sumer’s chief god was Ani/Anu, god of the sky, next was Enil, 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.

In the Mid-East, the city was the property of the city god. Temples were a god’s earthly home & the storehouses of grain. The large irrigated fields were owned by gods & administered by priests. Priests administered & recorded the surplus of agricultural products to support themselves & artisans. Temples were dedicated to one god. More refined & varied beliefs in gods developed. Rich persons who died were buried with gold & silver ornaments for the next life.

**First city-states**

The first records of any city-states were in Sumer, cities of Eridu, Nippur, Ur, Uruk (first large walled (to repel nomads) city, six square kilometers, possibly c50,000 population, bureaucracy), Assur, Umma, Kish, Lagash, and others. Their 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 (push sails, sailed only with the wind), wove baskets and cloth. Sumerians sailed/rowed, plundered when they could, traded when they had to, used balance scales. Sumerians were the first merchants / traders. Oars were more reliable than sails on the Mediterranean. Rowing required slaves/oarsmen. Sledges and pack animals were used for cargo. (The wheel was not yet invented. A wheel is part of a *system*. The wheel *system* includes roads.)

Sumer

Sumerian priests taught the inequality of men, that Man had been created expressly to free gods from having to work. Man was thus obliged to work ceaselessly. The priests said that their first duty was to attend to the gods’ wants, 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, & slow. Farming was probably women’s work. Men hunted, & later, when they domesticated sheep, goats, or cattle, became herders. Women were the property of their fathers, then their husbands. Marriage was a matter of property.

In all cultures around the Mediterranean, there were numerous gods, many beliefs regarding their gods. As farming developed, worship of gods associated with the hunt (developed during nomadic hunter gatherer times) was supplemented by worship of gods and goddesses associated with farming success, mother Earth, rain, Sun, etc.

**Writing began “history”**

“History” (preserving ideas / facts / events) began with writing, the most important technological development in the history of knowledge. Only Man can benefit from such preserved knowledge (only man can write). But, the important knowledge how-to that enabled civilizations to develop, tools, fire, art, boats, buildings, the plow, burial, farming, domestic animals, weapons, pottery, weaving, money, metal, and innumerable beliefs & myths, all pre-dated writing.

**c4000 BC**

Animals tamed

By 4000 BC, the horse (Ukraine), the water buffalo (China), & the donkey (Egypt), were domesticated. Earliest Egyptian records indicate numerous gods; 3 main gods, Ra/Re (Sun god), brothers Osiris & Set. Egyptians mined & smelted copper ore in the Negev, 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). Egyptians made papyrus reed boats with push sails, not used in the Med, only on the Nile. Megaliths (large stone structures) began to be erected in the British Isles & NW France.

**3761 BC**

Jewish year of creation of the world. Jewish beliefs / myths were similar to Egyptian & Mesopotamian beliefs / myths.
It increased yields, so supported more people & a larger class of non-farmers (priests, artisans) who advanced civilization. The plow required a draft animal. Its use spread slowly; i.e., Aryan / Persian invaders around c1500 BC brought the plow to India. The plow was also in Denmark by 1500 BC, but plows only came to China, separated from the Med civilizations by mountains / deserts / distances of central Asia, c2000 years later.

Peoples of some geographic areas, isolated and/or with climates unsuited to farming, or with no animals suitable to pull plows, never developed farming, thus limiting their population & 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.

**How-to knowledge:** The most powerful invention in farming was the plow; first known to be used in Sumer. The plow was first just a piece of forked wood that loosened the soil for planting. It increased yields, so supported more people & a larger class of non-farmers (priests, artisans) who advanced civilization. The plow required a draft animal. Its use spread slowly; i.e., Aryan / Persian invaders around c1500 BC brought the plow to India. The plow was also in Denmark by 1500 BC, but plows only came to China, separated from the Med civilizations by mountains / deserts / distances of central Asia, c2000 years later.

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**Menes,** king of the Upper Nile (worshiped Set), conquered the lower Nile (worshiped Osiris) and unified Egypt. He ruled at Memphis (near Cairo). The Egyptian Kingdom lasted c3000 years until Alexander conquered it in 333 BC.

First known symbols-words, Egyptian hieroglyphics. Egyptian doctors practiced surgery.

Egypt: How-to knowledge: Egypt was the Nile & the Nile was Egypt. The Nile flowed north, the winds blew south; so, drift north, sail south, in reed sailboats with push sails. Easy. Each of the various Egyptian tribes had numerous goddesses & gods, in total c2,000. The gods ranked the highest, then the dead, then the pharaoh/god king, then priests, then the people. Egyptians traded with Minoans on Crete (who worshiped a goddess); had symbols for 1, 10, 100, etc, i.e., a base 10 numbering system. As the priests explained, Egyptians knew that the Sun sailed over Egypt in a boat, & that the Set pig ate the moon every month, & hundreds of other myths / beliefs. Ptah became the principal god.

Egyptians saw no reason to change, barely changed over 3,000 years. 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 c29.5 day phase), with five days added at the end. The year started when the Nile flooded in the Spring. It was also the first sighting of the star Sirius. Egyptians used sundials & split the day into two 12 hour parts. Math was add, subtract, multiply, divide. Egyptians and Cretans had candles. The Cretan/ Minoan civilization paralleled Egypt's.

Egyptians had no concept of progress, i.e., a sense of improvement over the years & centuries. They dug canals to irrigate & tame the Nile. The yearly Spring flooding made the soil fertile. Egyptians traded with Phoenicians. c98% of the people were illiterate. They used skins, grew grains, irrigated, fertilized, built shelters, used fire, baked bread, mined & smelted ores, wove wool & flax, used a forked wood for plow, had laws, a numbering system. Egyptians practiced medicine, but knew/believed there was a divine origin of diseases. Thus, doctors sought divine guidance.

Sumerians in cities developed metal working, had irrigation, a four wheeled cart, sun-dials (like Egyptians), and, most importantly, developed a written language. Early pictographs developed into wedge-shaped symbols, cuneiform, using a triangular stylus on soft clay tablets (Sumerians didn’t have papyrus) with c2,000 characters, first as representing syllables, which, combined with other syllables, denoted words. Sumerian cuneiform writing was not deciphered until the early 1800s.

Sacrifice of animals (and/or humans) was the center of almost all known religions' rites. There were numerous gods in different temples, Sun gods, bull gods (male fertility), hawk gods, mother or Earth goddesses, water god, heaven god, goddess of birth, cow deities, People prayed to gods, who were not necessarily benevolent.

Neolithic Stone Age evolved into the Bronze Age as men learned to smelt metals. Use of bronze first developed in the Mid-East, Egypt, Crete, and Anatolia. Two soft metals, copper 90% and tin 10%, combined to create a hard metal, bronze. Discovery of bronze may have occurred in more than one locale. (Bronze Age only spread to China 1,000 years after it began in the Mid-East.) Sumerians perfected metallurgy to make weapons. Tin had to be obtained from as far away as Central Europe, and later, Cornwall, S W England. Most of Europe remained hunter / gatherers.

The Mediterranean Sea: The Western world was the civilizations centered around the Med. Simple oil lamps were used. Astronomical observations were important to know when to plant. Astronomers were the first “scientists” to see order in nature. Babylonians noticed 5 bright objects in the night sky that moved around faster than all the other objects in the heavens, so called them planets (Greek for wanderer), and named them. 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. They divided their lunar months into 7 day periods (a week) for the 5 then known planets plus the Moon and Sun. Egyptians based their calendar on the flooding of the Nile, which came about every 365 days, and 12 full moons each year.

Phoenicians (Canaanite Semites) occupied present Lebanon and Northern Israel and became seafarers.
The pyramids were built from c2630-c1830 BC. The biggest, of c2000 BC Egyptians developed weight standards and evolved the arch (but rarely used it). The arch takes nature apart and reshapes it, a great intellectual triumph. Egyptians were the first to make leavened bread from fermented grain. Sumerians and Egyptians developed wheeled war chariots, revolutionized warfare. Almost everyone was illiterate.

Egypt: Sepulchral iconography appeared on the first great pyramid, the step pyramid, the tomb of king Zoser/Djoser, built c2630-c2611. The Egyptians had no word for religion as there was nothing else that governed their lives. Egyptians lived to die, spent their lives (and fortunes) preparing for death & the afterlife, immortality. Egyptians never disputed the priests’ teachings that gods controlled all natural events. Pyramids indicate an extensive governing organization. Egyptians (and Sumerians) put bright stars into constellations & assigned seasonal appearances to them. Egyptians used 3 writing systems, pictorial hieroglyphics, a simplified version called hieratic, & its derivative, demotic.

How-to knowledge / technology preceded science: Egyptians built boats with planks from Lebanon, letting them sail the Med, rougher than the Nile, with square push sails. (Triangular lateen sails, allowing sailing into the wind, were not fully developed until the 15th century in Portugal.) Horses and camels were domesticated in Central Asia. Camels enabled caravans (goods) to cross the vast deserts. Egyptians began to use oxen to pull plows. The wheel reached the Indus Valley and most of Northern Europe only 1,000 years after it was developed in Sumer.

Osiris & Middle East Myths Egyptian myths predate history. The Pyramid Texts told of Osiris, who reputedly had brought civilization to Egypt, being cut into pieces by his brother, then put together by his wife & resurrected. Osiris was the most notable resurrection myth. Several ancient Mid-East religions also focused on a resurrection, including Tammuz in Mesopotamia, Attis and Adonis in Syria, Mithra in Persia (Iran), the Eleusian Mysteries, the Orphic Mysteries, & Dionysus, Greek god of wine, fertility, & patron of drama, resurrected by his father Zeus, then Jesus’ resurrection as Christianity’s central tenet. Such religions also taught that Man could win everlasting life after death. Osiris became popular throughout the Mid-East. The Pyramid Texts also described the embalming procedure used on Osiris (remove organs, dry body, wrap it); thereafter used by all who could afford it. Egyptians knew that Osiris was the judge of persons wishing to ensure a favorable journey to eternal life in the afterlife. On death, one had to prove to Osiris, who resided in the afterlife, that one had lived a virtuous life, that one had not done various specific bad acts. Fail the test and one is eaten by a combination crocodile/lion/hippo. Osiris thus granted salvation.

This concept of salvation was adopted by the later Christian concept of judgment and Heaven and Hell. Belief in an afterlife, dependent on conduct in this life, was an effective means of social control. God will reward the faithful. Georg Lichtenberg, German: Probably no invention came more easily to Man than when he thought up Heaven.

Hinduism is the name for the many philosophic sects of India with certain shared concepts, rituals, sacred texts, sacred sites, and the questioning of authority, but without the Western concept of a monotheistic God. How or when each sect began is uncertain. They are the oldest known philosophic and religious traditions, mostly skeptical. The Supreme Court
Atheism defined. Humanism

Various Hindu branches are vegetarian, practiced human sacrifice, pantheists, monotheists, and atheists. (Atheism is simply absence of a belief in any god by a reasoning person who is aware of the concept of gods, no more and no less. Atheism does not infer any positive beliefs, such as a moral code or ideology. There are evil atheists and good atheists. Humanism is atheistic with a moral code, *The Humanist Manifesto.*)

**c2000 BC**

**Hindu Caste System.**

While it had many differing beliefs, one of Hinduism’s two common basic ideas was the caste system, where your position in life, your caste, results from your karma, how you lived in previous incarnations. The Hindu scripture *Manusmriti* states that the castes were created by God. Right & wrong actions increase the positive & negative potential energy / apurva of each person. Apurva is eventually released (in this or the next life) & causes good or evil to the person. So, misfortune is caused by your prior incarnation’s bad deeds, not from gods. Wisdom is the realization that everything is suffering. Your caste determines 1. Whom you may socialize with / marry, 2. Where you may live, 3. Your diet, & 4. Your job. If you are born to a dung collector, you stay a dung collector all your life, & it’s your fault. The concept of castes is a false and cruel system of social control. (*Nehru & Gandhi* rejected Hinduism, see 1947)

Hindus have 3 kinds of priests, Brahmans, gurus, & yogis. The religious activities of Hindus are devoted to ritual observances that permit every aspect of life to come into tune with various gods. Religious Hindu sects ascribe different powers to different gods, similar to other god systems. The four goals of human life in classical Hindu thought were dharma (duty, righteousness, *ethikos*), artha (livelihood, wealth), kama (sensual pleasure/ fulfillment), & moksa/moksha (liberation, freedom from *samsara*). It believes in reincarnation, as a human or animal.

As one can do nothing to change one’s past life, even the lowest castes, without education, those persons it treats most cruelly, did not question it. Hinduism thus, like other cultures, enshrined inequality of opportunity as part of an unchangeable cosmic scheme. The ruling Brahmin caste cruelly supports it to keep their favored position.

**Hindu Trinity, the Trimurti**

The Hindu divine trinity are *Brahma*, Vishnu, and Shiva. (*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 c700 BC) as the most sacred scriptures is Hinduism’s other common idea. The central theme of the *Upanishads* is the identity of the human and divine or cosmic. The *Rig-Veda* (verses of wisdom), the *Sama-Veda*, and the *Yajur-Veda* are books of hymns. 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.

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. Vaisyas - 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 - diseased- beggars - menial jobs- they wander the streets.

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.

**c2000 BC**

**Sumer Epics**

The Sumerian epic poem, *Gilgamesh* (the historical king of Uruk, who lived c2900 BC), inscribed c2000 BC on 12 clay tablets was discovered by *George Smith* in the British Museum in 1872. It is the first known writing to focus on an individual’s morality, including a flood story, with details virtually identical to later Greek heroic epics & to *Genesis* in the *Bible*. The poem protests against the injustice of the gods not giving Man eternal life. (There are numerous similar flood myths from many Mid-East cultures of a few persons surviving after getting instructions from a supernatural being.) Sumer’s second epic poem, *The Epic of Creation*, was a praise of their king, *Marduk*.

**Problem of Evil**

A third epic *Poem of The Righteous Sufferer* written over 1000 years before the *Book of Job*, questioned why the gods inflicted a foul disease on an innocent & pious man. Answer: The ways of the gods are unfathomable. This is the earliest known iteration of the *Problem of Evil* (see 300 BC). Shamash the Sun god brought justice to men, punished evildoers and, according to *Hammurabi*, gave him the laws. (Like Yahweh later gave *Moses* the *Ten Commandments.*)

Many cultures have myths involving gods that explain lakes, mountains, rock formations, etc.

**Human Sacrifice**


The *Old Testament* / *Hebrew Bible* says *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, founder of Judaism, was that Abraham’s descendants would inherit Canaan. Judaism is the most lasting & most influential religion of ancient Mid-East cultures. The major classes in the earliest civilizations were:

1. Priesthood. Priests everywhere joined kings/princes/elders to keep the lower classes submissive.
2. Kings and their courts.
3. Peasants/slaves/serfs. (Artisans developed from the slave class).
4. Merchants, at first, shipowners.

Separate minor classes were small retailers, gang workers, seamen, herdsmen, and mercenaries.

Daily life: Mesopotamians worshiped hundreds of gods & goddesses, who controlled various aspects of life. They used sundials & discovered what’s now known as the Pythagorean Theorem. The spoke 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 countries. Mid-East use of bronze (copper+tin) reached Europe & China c1800 BC.

Hammurabi, founder & warrior king of Babylon, promulgated the first known Code of laws, to insure “that the strong not oppress the weak.” Hit your father, lose your hand. Help a slave escape, die. Put out a nobleman’s eye or break his bone, lose one eye or break a bone. Put out a slave’s eye or break his bone, pay one mina. To divorce, return the dowry.

Civilizations began to develop in places beyond irrigable river valleys. On Crete, the Minoan civilization (matriarchal religion, discovered only in 1900) flourished, & was the most sophisticated of all; bathrooms had running water, had elaborate art, buildings had light & air shafts. Minoans dominated the Med trade from c2000 BC to c1600 BC.

Shang, first known Chinese dynasty, united & ruled China until c1000 BC. 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) in China and Viet-Nam by 1600 BC, over 1,000 years after Bronze Age in the Mid-East. Chinese (probably) made water clocks, developed pictographs for words. The earliest known Chinese writing was pictographs on bones and tortoise shells. Chinese “religion” emphasized ritual with little emphasis on dogma. Slaves were buried with Shang kings to serve him in the afterlife.

A volcano destroyed Santorini/Thera. Resulting tsunami (or Greeks) wiped out the Minoan Civilization on Crete.

Chinese writing had c25,000 characters. The system of pictographs, still used, created the class of Mandarins who could write and govern. A Mandarin’s education was mainly learning to read. Only the wealthy could afford to study.

Pharaoh Amenhotep 4 / Akh-en-Aton (1375-1323 BC), husband of Nefertiti, said there’s only one god, Aten, the Sun god. He abolished other gods. After his death, the polytheistic priests of Amon Re discarded his monotheism.

Jews: Like other Mid-Eastern cultures at the time, Jews first had many gods, and many beliefs. After Moses, Abraham’s tribe’s god, Yahweh (originally a desert war god), developed for Jews into being the greatest god of all and then to being the only God. Judaism thus has become the first enduring monotheistic religion.

According to the Hebrew Bible, written hundreds of years after the fact), Moses received the Ten Commandments on Mt Sinai from Yahweh. Exodus 19:18-25 & 20:1-25, Deut. 5:6-21. The Ten Commandments were instructions (to men) on how to live & gain favor with Yahweh. Moses was the first to proclaim that Yahweh created the world. (Yahweh means “He who causes to be”). Genesis 2:4 shows Yahweh as the creator of the universe & mankind. Yahweh was transcendent. He created Nature but was not in it. The Moon and Sun were not gods but Yahweh’s creations.

Moses The Ten Commandments closely resemble parts of Hammurabi’s Code. According to the Hebrew Bible, after getting the Ten Commandments, Moses said that Yahweh told him to kill those who had worshiped a golden calf. 3,000 were slaughtered. Moses also said that God also told him to build an altar to sacrifice animals. He did so.

The Argument from Religious Experience (“I saw / spoke-to God, therefore God exists," Moses), is one of the oldest and simplest arguments for God. It relies solely on the plausibility of its claim. I saw / spoke-to God, is as probable/improbable as any of a multitude of other similar claims. If the argument was valid, then every claim of seeing / speaking-to God would describe God and his commands identically. They don’t.

Moses led Jewish slaves from Egypt to Canaan, where they joined Hebrew tribes living there. Jews developed the notion that one God / Yahweh had made a paradise, from which Man, Adam (Hebrew for man) & Eve (Hebrew for life) by their own fault, were expelled. Jews were the first to insist that men, not gods, were responsible for their acts. Yahweh reputedly gave the pious a long life & the impious an early death. But some evil people prospered & lived long
OlmeC

OlmeC Civilization, Central Mexico, first civilization in the Americas, developed writing. (OlmeCs declined c400 BC.)

c1300BC

Moral codes are basically social codes. Various versions of the Golden Rule: a basic moral principle:

Hinduism, Do nothing to thy neighbor which thou wouldst not have him do to you hereafter. Mahabharata 5.1517

Golden Rules

Zoroastrianism, Whatever is disagreeable to you, do not do unto others. Shayast-na-Shayast 13:29, c1200 BC

Judaism, Hillel, What is bad to you, do not to others; that is the entire law; all the rest is commentary. Shabbat 31.1

Buddhism, Hurt not others in ways you yourself would find hurtful. Udana-Varga 5.1

Socrates / Plato, Do to others as I would should to you. The Republic, Book.11:913.


c1200-800 BC

Greek Dark Ages: Hellenes (1700 BC) were also influenced by the Mycenaean culture (centered around the northern Peloponnesian peninsula). Barbarians invaded Greece, causing the so-called Greek Dark Ages. Hellenes civilization stagnated, its language ceased to be written for 300 years, cities fell, fewer & smaller communities, 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, & economic unit. Greece is largely mountainous, isolating its cities. Greeks had metal armor by 800 BC.

Iron Age

Iron Age followed the Bronze Age: Iron, at first from meteorites (9 to 1 iron nickel alloy, harder than bronze) The use of iron from ore became widespread in Palestine & Syria. Possibly accidentally carbon from charcoal used to smelt iron mixed with the iron & made steel. The Iron Age spread slowly to Central Europe by the 8th century BC and to N. 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 10-100x bigger than hunting.

c1046 BC

China: The Zhou dynasty (rational philosophy) replaced the Shang (mysticism), & ruled until 225 BC. Zhou developed a philosophy with a mandate from heaven. Its claim to obedience was its religious superiority. Millet, adapted to the arid northern regions, was the staple diet in China, Korea & India until AD c1000 when rice replaced millet.

The East (East Asia) & the West (the Med) were connected by only the thinnest of threads, various caravan routes, nothing more than trails, which, collectively, beginning only in 1870 became known in the West as the Silk Road.

Technology developments: 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.

The use of camels enabled desert nomads and traders and armies to travel farther into previously inaccessible territories in northern and central Asia. The Mayan Civilization began to form in the Yucatan, lasted til AD c900.

The first known arched bridge was built in Smyrna / Izmir (Western Asiatic Turkey, Anatolia).

c900 BC

Jews; Jezebel, Phoenician wife of Ahab. Israelite king, built a temple to the Canaanite pagan god Baal. So followers of Yahweh killed her. The oldest books of the Hebrew Bible were reputedly written around this time. The Hebrew Bible spoke to Jews and was largely silent about the rest of humanity, and barely mentioned an afterlife. The Hebrew Bible/ Old Testament (and later the New Testament) refer to magic, witchcraft, and soothsaying as realities.

Ninth to seventh Century BC

The Iliad (the wrath of Achilles against King Agamemnon) and The Odyssey, Odysseus/Ulysses’s wanderings back from the wars at Troy, the greatest epics of Greek mythology/history, told of the heroic Greeks, how Troy was conquered. They helped standardize the Greek language. The Iliad is the first great romance of high adventure, of deeds of chivalry & wild fighting, of brave men & noble women. Notably, the heroes spoke & acted rationally, making an important change from a world of magic & miracles to one of reason. Odysseus in trouble invoked no gods.

The Odyssey is the first great novel of adventure in strange parts, of miscreants thwarted and brought to justice by the hero who wins and returns to his wife. These epics told of Greek gods with human characteristics. 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

Both epics were attributed to a reputedly non-literate blind poet Homer of Ionia. They contained many short stories; were originally only oral, sung by wandering bards, with no fixed text, & not written until the Greeks developed their alphabet from the Phoenicians c850 BC. When written, they were probably transcribed a century apart as they had different writing styles. For hundreds of years until Plato’s time, these epics were the basis of Greek religion, morals, the chief source of history, & even of practical information on geography, metallurgy, navigation, and shipbuilding. Homer may have been one person or just represented the entire Greek memory.

Iliad, Odyssey

Beginning during the Greek Dark Ages, many Greeks sailed/rowed to Aegean islands & other parts of the Eastern Med. They colonized Sicily & the coast of Anatolia (W. Turkey, including Miletus, an Aegean port town). The Greek economy was based on trade. They established over 100 trading ports, around the Black Sea, in Italy, Anatolia, Libya, & S. France (Marseilles), including Byzantium (founded in 661 BC, later called Constantinople), some of which towns
grew larger than Athens. They traded grain, salt, copper, millstones, gum. A feeling of national consciousness developed among Greeks based on a common language, albeit with dialects. They had numerous gods and built shrines/temples to their gods. Greeks (and later Romans) were expected to publicly worship the gods.

**Alphabet**

The Med Civilizations all 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, & Greece. It was the basis of all modern European alphabets. Sometime 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, and ancient Hebrew (No vowels in modern Hebrew) Greeks also began to mint & 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 seafaring Greek traders. Semitic Phoenicians from Tyre and Sidon (present Lebanon), were principally seafarers/traders in the Med. The Greeks stepped out of unrecorded history with a highly developed civilization, portrayed in their two epics. They started the modern world going.

**Greek gods**

Greeks started with the development of a new communications device, their alphabet, and papyrus. Between 750 BC and 350 BC, most of the world’s dominant faiths developed independently, Confucius/K’ung fu-tzu/Grand Master K’ung (551-479 BC) & other Chinese philosophies, 2. The Upanishads and Gautama Buddha (c528 BC) in India, 3. Zarathustra/Zoroaster (ethical dualism) in Iran, 4. Jainism (self-denial, against the caste system), 5. Lao-tse in China, 6. Judaism. 7. India also developed the Lokayata/Carvaka materialistic tradition (c600 BC).

**Reason in Greece & India**

“Science” is sometimes thought of as a set of beliefs, theories, and natural laws. All religions also have their sets of beliefs, coming from their supernatural deity, and thus are un-changing. Scientific beliefs are not set; they are merely the currently accepted principles / laws of the various sciences, subject to change as the particular science advances.

Science thinking originated in Greece with the Ionian philosophers, Thales, and his two disciples, Anaximander, and Anaximenes, all from Miletus (a Greek port city on the Aegean in Anatolia), and Pythagoras of nearby Samos. Why Greece? While virtually all religions believe that their beliefs are the one true beliefs, Greeks, as seafarers, traded with other cultures, and saw that other cultures all had their own myths and beliefs equally venerated. So beliefs varied by location. Plus, the Greek gods had human traits. Some did evil things. The oracles spoke in parables. Little was certain. Greeks had no class of priests whose jobs were threatened by Greek philosophers, that is, no well-organized enforcers of myth and superstition to constrict their thinking.

**Why Greece?**

Natural Philosophy / science: Thales (c630- c546 BC). One of “Seven Wise Men” of Greece, was the first known
Thales?  

**Thales** founded Greek geometry: he saw 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 (This was **Thales’s Theorem** and is the basis of trigonometry) Thales saw that the hypotenuse of a right triangle squared = the sum of the squares of the other two sides. (now called the Pythagorean Theorem, see 540 BC). Thales used it; Pythagoreans later proved it. 

**Nature of the world**  

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. Geometry became the foundation for a rational system of natural philosophy that underpins Western culture to this day.

**c600 BC** Thales was the founder of 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. Thales proposed that the bright band in the night sky (known as the Via Lactea, Latin for Milky Way) might consist of distant stars. Galileo confirmed this in 1610 with his telescope. “Science” was called “natural philosophy” or Philosophiae Naturalis until 1840. As knowledge builds on knowledge, writing let men more easily learn what those who came before them knew (and believed).

**Thales’s big question:** Trees, fields, plants, animals change, but is there something that does not change, that is permanent? 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. Not a bad guess, but wrong, and his significance and the most important insight in the history of knowledge is that he didn’t resort to a supernatural explanation, but said the world could be understood rationally by the human mind. He believed that there was *order* in nature.

**How Thales thought**  

Philosophical & scientific reasoning proceeds mainly by clarification and argument. Philosophers present reasons 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 one of the deepest of the instincts leading men to philosophy, science, and religion. Religion promises understanding in two forms, God and immortality.

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 community of those who could read throughout the known Western world (the world around the Med). Greeks then developed organized knowledge for such literates. The world that Thales tried to understand was the world of things he could see and experience, not thoughts in people’s minds.

Thales knew, not discovered, that amber (solidified sap) rubbed against wool (electrons transfer from wool to amber), would attract light objects (Greek, elektron = amber). This is electrostatic attraction, different from magnetism, which he also studied. After Thales, philosophers posited various explanations for the true nature of the world and Man.

Greek thought was thinking in words. So Greeks looked for certainty, general principles beyond the words of gods. Pre-Greek thought was undirected, thinking in images. The word *scientist* was coined by William Whewell in 1840.

**India**  

India: Hinduism (with many theologies and without a controlling priesthood) at the same time also saw an explosion in rational thinking. Six philosophical schools tried to answer fundamental questions like “what is real? Why / how does X happen?” *Samkhya* believed there was no God and that the world was real due to the interaction between the two substances, prakriti and purusha. *Yoga* believed in a supreme being (Isvara) and that the world was real. *Vedanta* believed that the world was not real as it was an emanation of Brahman, the only substance that truly exists.

**Zaratustra,** (Greek, Zoroaster), Persian, founded Zoroastrianism, worshiped fire, wherein the basic fact of existence was the universal opposition of the two creative cosmic powers, a good god, Spenista Mainyu/Ormuzd (light, truth, frankness), and an evil god, Angra Mainyu/Ahriman (secrecy, cunning, darkness, diplomacy). True religion was in Man’s allegiance with the one true god, Ahura-Mazda, the only true god against the evil Angra Mainyu. Such dualism appeared later in Manichaism, Gnosticism, Judaism, and Christianity (to a very limited extent).

At the end of time, Ahura-Mazda will emerge victorious & 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 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.” Mithraism likely originated in Tarsus, the home of Saint Paul.

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

### c594 BC

**Solon** the Lawmaker laid the foundations for Athenian democracy, moderated *Draco’s* harsh laws, covering all areas of life, trial by jury, a constitution. He cancelled all land debts, freed people who had been put into slavery for debts, legalized brothels, gave male propertyless citizens the vote in the assembly and on juries (not in the U.S. until the 1820s). Greeks invented politics, the idea of deciding public affairs by discussion in a public setting. But Greek cities’ citizenships did not include women, slaves, freedmen, even city-born Greeks whose father was born outside the city.

### c590BC

**Natural Philosophy / Science:** **Anaximander** (610-547 BC), a student of **Thales**, from Miletus, explained the world without reference to gods. He said that humans were at the center of an interconnected universe that ran without divine intervention. He was the first known map maker, made charts of the Med and the stars. He theorized that all nature was made up of varying amounts of four elements, water, fire, air, and earth. He thought the Earth was a curved solid mass shaped like a cylinder suspended in space.

### Evolution

His *On Nature* posited a concept of evolution, “Man 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. **Anaximander** was the first to state what later became known as the principle of sufficient reason, that is, There’s a reason / cause for everything that happens. *(Leibniz 1710 similar)*

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.

### c586 BC

**Nebuchadnezzar**, King of Babylon, conquered Jerusalem, destroyed the Jewish Temple, exiled elite Jews from Judea to Babylon. In “Babylonian exile,” Jewish scholars began to compile their holy scriptures, now known as the **Hebrew Bible** from Arabian, Assyrian, Persian, Chaldean, Egyptian, and their own myths. Much of Judaism as a religion came into being. The **Hebrew Bible** has 3 parts, written over several centuries, The Law/Torah / Pentateuch, The Prophets, and The Writings / Hagiographia. The story of baby Moses being in a basket which floated in the river has features similar (not identical) to an earlier myth about **Sargon**, a Semitic Akkadian king. *Genesis*’s 1:11 creation narrative is most likely from *Enuma elish*, the Babylonian creation myth and is similar to a story in the library of King **Ashurbanipal** at Nineveh written around 650 BC and to other ancient myths of the Chaldeans, Phoenicians, and Assyrians. One large theme emerges from its hodgepodge of sources, man’s nature and destiny in the face of God.

### Hebrew Bible. Problem of Evil


### What Jews Know

The Jewish God said, “I the Lord thy God am a jealous God (repeated numerous times) visiting the iniquity of the fathers upon the children onto the fourth generation.” *Ex. 20:25*, *Numbers* 14:18. As Eve ate from the tree of knowledge, God told Eve “in sorrow thou shalt bring forth children; and...[thy husband] shall rule over thee.” *Gen.3:16*. The Jewish God commanded that Jews fear him. *Deut. 6:2; 7:13, 21:4, 8:6 (more)*, & to take the Bible literally *Deut.13-1*. A girl was owned by her father who could sell her as a wife or slave *Ex. 21:7*. An uncircumcised boy is to be abandoned by his parents and the community *Gen. 17:14*. God **killed** those who complained *Num. 11:1*, and those who offered incense. *Num.16:35*. God gave **Phinehas** & his sons everlasting priesthood for killing a Jew for having a foreign wife. *Num 25:13*. A child born out of wedlock couldn’t enter into the Lord’s congregation for 10 generations. *Deut. 23: 2*

### c586 BC

**The Jewish God ordered a lot of killings**

The **Hebrew Bible**’s God commands killing all who lived in the promised land *Deut. 6:15*, plus Hittites, Girgashites, Amorites, Caananites, Perizes, Hitites, blasphemers, & Jeubites *Deut. 1:1-3 & Lev. 24:11-14, & 16 & 23; Homosexuals *Lev. 20:13; Perjurers Zechariah 5:4*; Those who hit, curse, or disobey a parent *Ex. 21:15 & 17 & Lev. 20:9 & Deut. 21:18-21; Non-virgin brides *Deut. 22. 20-21*; Men who have sex with a betrothed woman (& the woman also, if it occurs in the city & she does not cry for help), *Deut. 22:22-26*; *Heretics* *Ex. 12:29; Thieves Zech. 5:3-4; Unchaste priests’ daughters (as it dishonors the father) *Lev 21:9*; Those who work on the Sabbath (even gathering firewood) *Ex. 31:14-15 & Num. 15:32-36; Adulterers Lev. 20:10-12 & Deut. 22:22; Persons (even in your family) who believe in another religion (or who worship idols, the Sun, or the stars. *Deut. 13:7-12, 17:2-7, & Ex. 22:20*; Women with familiar spirits *Lev 20:27;False prophets* *Deut. 18:20*; Those who take the Lord’s name in vain *Lev. 24:16; Witches *Ex. 22:18 & Lev. 20:27; Men or women who have sex with animals *Ex. 22:19 &Lev. 20:11-16; Dissidents *Ex. 32:27; The sick & crippled *Num. 5:2-4*; *Foreigners* *Deut 7:2; Men who have sex with their father’s wife* *Deut 22:30*, or with other men, or their mother-in-law, aunt, or daughter-in-law, *Lev. 20:11-16*; *Persons who won’t surrender* *Deut. 20:10-14*. Harsh by modern standards. But, sex with one’s daughter was not prohibited.

If a man has sex with a non-betrothed virgin, he must marry her & pay her father 50 shekels. *Deut. 22: 28-29*. [If it was
Measure

Chosen people

Before 586 BC, Jews had suffered numerous disasters. Rabbis said it was Yahweh's punishment for their apostasy (not being a believer). Jews were always God-obsessed, believed the purpose of life was to serve God & prepare for the world to come (like Egyptians). Life is a precious gift from God. At this time, marriage with gentiles was prohibited.

Jews knew that they were the chosen people because:
1. They were given the law (the 10 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 & evil gods who caused good & evil. Jews said Man alone was responsible for his acts. Judaism expected that a Messiah would come & deliver them from their suffering, & so was largely indifferent towards unbelievers. Cyrus the Great in 537 BC let them return to Jehud Province. They rebuilt the temple in Jerusalem.

Philosophy: Xenophanes (c570-475 BC) a poet of Colophon, traveled throughout his life, denied the Olympian gods existed, thought the idea of such gods was silly, but did believe in a single God. He speculated that as sea shells were found on mountain tops, mountains must have been under water sometime. 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 & snub-nosed; Thracians' gods have blue eyes & red hair.” Thracians were redheads. Xenophanes said that there was 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.

Greek culture: Art changed from Egyptian archaic frontal style to more human. While Greek painting was merely an adaptation 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), 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/or his creatures.

Thebes, Athens, Macedon, Sparta, Phoenicians, Rome, Etruscans (Tuscany), 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.

Anaximenes (c585-c528), third of the Milesian philosophers, he said rainbows were natural phenomena, not divine, like Xenophanes (above). Re Thales, he said air was the unchanging substance, and all things were made up of air in different densities. Fire was rarified air. The next stage of Greek philosophy was more religious/moral, less scientific.

Pythagoras founded a group of scholars known as Pythagoreans, who thought mathematics was the key to understanding the universe, the world was a rational ordered whole, that numbers could have real influence on material things.

Pythagoras's big insight that there’s something about the real world that is intelligible in mathematical terms is probably the second great advance in the history of human thought. Wrongly, he and his followers believed things are numbers and vice versa, verging on nonsensical numerology. They tried to explain the world in terms of whole number ratios.

Pythagoreans discovered that the length of a vibrating string was proportional to the notes produced, & believed that the whole universe was based on a mystic order, or kosmos. They treated women as men's equals, property was held in common, scientific & mathematical discoveries were deemed collective. Pythagoras was concerned with the immortality of the soul. He wrongly said planets traveled around the Earth on crystalline spheres. Said, "Reason is immortal, all else mortal.” He is incorrectly credited with the idea of the music of the spheres.

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 certain rational principles that Man can understand. His universe had Earth at the center,
He put knowledge and science as a path to salvation. (Russell: Due to him mathematics is the chief source of belief in eternal and exact truth and but for him theologians would not have sought logical proofs for God.) The influence of geometry on philosophy and science cannot be underestimated. He and his disciples led a simple life. After his death, his disciples were credited with the proof of what came to be called the Pythagorean Theorem, although the theorem itself was known to Thales and may have been known to the Babylonians 1,000 years earlier. It is the most important single theorem in the whole of mathematics.

Pythagoreans said the Earth rotated on its axis. Philolaus, a Pythagorean, suggested that the Earth orbited the Sun. This was further developed a century later by Heraclides (350 BC) and Aristarchus (270 BC).

Right triangles are the basis of trigonometry. 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. They believed that three kinds of people went to the Olympics, merchants, the lowest rank, then athletes, and highest, spectators/thinkers. Athens had a public library by 530 BC.

c530 BC Chinese philosophy: Confucianism, without gods, thus not a religion, had harmony and justice as its central idea. Confucius, a conservative, stressed the importance of a central government and filial piety. The ideal relationship among human beings is jen (humanity or goodness), the perfect virtue of men, 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 proclaimed any 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. Confucianism is practical, social, ethical, full of advice on how to behave, more code than creed, with no church or clergy.

Confucius taught that all eminence should be based entirely on merit (ability and moral excellence which essentially meant learning Confucian texts), except for the hereditary ruling imperial family. One’s birth purportedly meant nothing but because of the complexity of the Chinese written language, only wealthy children had the means to learn to read and write the difficult written language. The prevailing feudalists could thus live with the meritocracy myth and bequeath their positions to their sons. Confucius assumed men were unequal, measured by their understanding of written (Confucian) texts. Confucius was more concerned about the fate of society than the souls of its inhabitants. (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)

Analects Confucius’s sayings were later collected in a book, the Analects, then incorporated into the Thirteen Classics, which were to China as the Bible was to the West, to teach Chinese officials how to rule. “To be able to practice five things everywhere under heaven constitutes perfect virtue. These are gravity, generosity of soul, sincerity, earnestness, and kindness...Hold faithfulness and sincerity as first principles.” “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 analects’ principal ideas were: : Jen, the ideal relationship among men, is the perfect virtue. Man is basically close to jen by his very nature, but its actions should be controlled by the rules of propriety. The ideal man is one who practices jen in accordance with propriety, so man seeks the Tao, the right way.

Confucianism stressed the relationship between persons, based on proper behavior and sympathetic attitude. His “Golden Rule.” “Do not impose on others what you do not wish for yourself.” Analects 12:2 and 15.24. Also, “The proper man understands equity, the small man understands profits...Wisdom, compassion, & courage are the three universally recognized moral qualities of men.” “In a country well governed, poverty is something to be ashamed of.” Analects 8. The cautious seldom err. Analects 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 corollary to Socrates’s Royal Lie (420 BC) and St. Peter’s later instruction to obey all human authorities 1 Peter 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.

529 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-c483 BC), became known as the Buddha (ancient Indian title for the Enlightened One). Born wealthy in Kapilavastu, Nepal. At 29, he left his wife & infant son to wander & think for 15 years.

In 528 BC, he said he had found the way out of the eternal cycle of birth, death, & rebirth, attained the Awakening & realized the Truth. All acts, good & bad, have consequences. Longing, hate, & ignorance lead to new suffering. To break this chain, one must release all passions. Thus the Truth consists of four “Noble Truths,” 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),
2. Man’s sorrowful condition is due to Man’s craving (trishna), i.e., three selfish Desires (a. Desire to gratify the senses, b. Desire for personal immortality, and, c. Desire for prosperity, worldliness),

“When a 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. Gautama specifically disclaimed any interest in the riddle of creation. As no god was involved, Buddhism is an ethical doctrine rather than a religion. But a theology developed about Gautama that he was a god. Similar to Lokayata, both Buddhism & Jainism began, in a sense, as Hindu reforms that explicitly rejected much of the Vedas, particularly their supernaturalism.

In later centuries Buddhism split into three main streams of thought.
1. The Theravada (stress the brotherhood of monks, the sangha, as the principal means of achieving nirvana).
2. The Mahayana (1st century AD, taught the existence of souls called bodhisattva, who achieved sainthood but declined entering nirvana so they could help others achieve sainthood).
3. The Tantrics/Vajrayana 6th century AD, expanded the number of supernatural deities beyond the bodhisattva, including demons who can be called on for help through rituals.

The Buddha doesn’t give favors to those who ask him. Meditation leads to self control, purification & enlightenment. 

Buddhism and Jainism, both atheistic, took reincarnation (like Hinduism) to be a basic principle of the universe, and both sought to escape from the circle of births and deaths through correct knowledge and conduct. Jesus later adopted Gautama and Lao-Tse’s admonition to turn the other cheek. 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.

509 BC Rome revolted, won independence from the Etruscans, and formed a republic with a ruling Senate, not elected, just the wealthiest c300 men. The Senate ruled, but Tribunes, representatives of common citizens, were also in the government. The city’s motto was Senatus Populsque Romanus SPQR, 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 most work.

508 BC Athens was at the time a Greek city of no particular distinction. Cleisthenes took control in Athens, put all citizens (free males) in ten new tribes, each of which elected 50 members by lot each year for a new council of 500, which administered Athens’s foreign & financial affairs & prepared matters to be debated and voted on by the assembly / town meetings, i.e., male citizens/demos. Athens thus became a modified democracy, 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 primacy of the territorial state over competing principles of social cohesion.

c510 BC Mahavira (c540-c468 BC) founded atheistic Jainism, promoted self-discipline above all else. Jainism was a reaction against the formalism of Hinduism. Gods, sacrifices, and rituals were non-existent or irrelevant. The universe cycles 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 generally 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.

504 BC Heraclitus (c535-c475 BC) of Ephesus (a Greek port in Anatolia) shifted the focus of Greek philosophy from what things consisted of (Thales, Democritus, Anaximander) to the problem of change. One of first dialectic philosophers; his chief idea was that “All is flux. Everything flows and nothing stays...You cannot enter the same river twice...(true only if one defines river as the particular water in it at any given time.) War & strife between opposites is the eternal condition of the universe. Nothing endures but change.” Fire, symbolizing change, was the basic reality as well as his answer to Thales’s question of an unchanging substance.

Reason 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). 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).

**Philosophy:** In contrast, Parmenides (c540-c480BC), in S. Italy, the most Indian of the Greek philosophers, said that nothing ever changes, that there is only one, infinite, & eternal & indivisible reality, & we are part of this unchanging One, despite the illusion of a changing world from our senses. He invented metaphysics based on logic, said the senses were deceptive, & condemned the multitude of sensible things as mere illusions. The only true being is “the One,” which is infinite & 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. So 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.

**c500 BC**

The cultural dominance of the Mid-East ended. The 4 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 the subjugation of women was the accepted usual order of all societies.

**Greek thinking**

Background: Greek thinkers, not Athenian, were the first modern men. So it took c6M years from when Hominids first evolved for Man to develop systematic thinking, just c2,700 years ago. In the beginning, all systematic search for knowledge was called philosophy or natural philosophy. Philosophers were simply thinkers, later known as physicists, chemists, etc. (philosophy means love of wisdom). Greeks never figured out positional notation.

The Hellenes, adopting the arts & skills of the Creteans/Minoans, evolved a new culture of scientific inquiry, individual dignity, civic duty, & human freedom that inspired the Western world for 25 centuries. While the Hellenes did not progress as far as modern Man in physical sciences, they have carried philosophy, especially ethical philosophy, as far as modern philosophers. Even modern physical sciences have been partially based on Hellenes/Greek ideas.

By 500 BC, the Jews’ religion of Yahweh had transformed from a group of one tribe into a religion claiming universal validity for itself & error for other religions. A tomb from c500 BC in Burgundy had a four wheel chariot, personal property, & a gold diadem (indicating a social hierarchy, a warrior class, & an artisan class).

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. There is 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 AD 604 and Shinto had to distinguish itself from Buddhism. Shinto is non-exclusive. One can be Christian and Shinto.

Greeks were a relatively insignificant group of rival cities in a small area. Athens was not the largest or richest. Sparta, one big army camp, was larger. However, the Greeks had a common language and religion, paganism, with numerous gods. Militarily, the Greeks developed the phalanx, a mass of citizen / farmer / 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. In Athens, basic education was for all free men. Beyond that, tutors or teachers.

**Greek Drama**

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 (c525-465 BC) invented drama by introducing a second actor into his plays. His plays dealt with age-old problems of the conflict between Man and gods. He wrote Agamemnon (whose hubris led to his death). Said, “Fear is stronger than arms.”

490 BC

Persia, then the largest Western empire, under Darius 1, attacked Greece. Persia’s attack united the Greek cities, & at Marathon, 26 miles from Athens, the Greeks won. In 480 BC, the Persians tried again, took Athens, but the Greek fleet at Salamis & the Greek army at Plataea defeated the Persians. One key to Athens's victory was her fleet of 200 new triremes (3 levels of rowers), who, though outnumbered, outmaneuvered the Persian fleet. The fleet enabled Athens to win the battle. The Greeks were mariners and explorers. The sea was home to them. Thus, while Athens is remembered for many things, importantly democracy and philosophy, its military skills made them possible.

Athens was still not then the dominant Greek city, but due to the Persian victory, and in contact with other cultures, it became the focus of all that was most significant in Greek Civilization. From c490 to 300 BC, the center of Western civilization shifted from Mesopotamia / Persia to Athens. Athens dominated the Med trade.

**Before Socrates**, no great Greek mathematicians or philosophers were Athenians. Athens was a democracy for free males. Women could not own property. In Sparta, they could. Due to the Greek philosophers, reading and writing first escaped from the temples and king’s court, and was the first beginnings of the free intelligence of mankind. Greece’s “Golden Age” started. Greek art and writings portrayed Greek gods as humans.

Herodotus (c484-c421 BC), invented history by telling why big events occurred. He told a coherent story, traveled
widely, explained how Greeks beat the more numerous and better armed Persians in 490 and 480 BC; namely, 1. Persian arrogance, 2. The Greeks were fighting for their homes, their city. 3. Persian soldiers were slaves, did not believe in their cause. Herodotus also described Indian cotton to Greeks.

c480 BC

Natural Philosophy: Alcmaeon dissected humans, noted the optic nerve & the Eustachian tubes, saw the difference between veins & arteries, recognized the brain as the seat of intellect, & the connection between the brain & sensing organs. Suggested health was a balance between opposing humors. Illnesses caused by the environment & lifestyle.

Sophism

Sophism: Athens became the center of a new kind of teacher, the Sophists, who traveled from town to town, experts who taught wealthy young men the verbal skills and knowledge to advance in a democratic polis. They thus encouraged independent thought. Sophists rejected earlier Greek philosophers’ speculations about the nature of the universe and the place of divine forces in it. They taught rhetoric /argument, that language was susceptible to analysis and manipulation according to logical rules.

Sophists rejected myths

Sophists had a relativistic attitude toward moral values and thought that the only worthwhile object of study was human behavior as the pursuit of one’s personal enjoyment (bodily or mental) was the only sensible goal. Sophists caused Athenians to consider whether their ideas and customs were founded on truth or simply conventional ways of behaving. Sophists rejected the rationalistic speculations about the nature of the world in favor of focusing on observation of events & 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.

c450 BC

Leucippus (c490-c430 BC) from Miletus formulated Atomic Theory, his pupil Democritus later (430 BC) elaborated & explained that everything is made up of tiny indivisible particles, atoms, his correct answer to Thales’s question, before philosophy turned from the study of nature to the study of Man under Socrates and Plato. First to say every event has a natural cause and thereby prepared the way for a coherent theory of motion and change.

Mind and Matter.

Anaxagoras (c500-428 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, etc. rationally. He was the first philosopher to describe a conflict between science and the supernatural. 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, who ruled Athens from 460-429 BC.

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 atomistic explanation of universe, that all natural objects are composed of infinitesimally small particles he called seeds, each containing mixtures of all qualities, albeit in differing proportions, and that the mind, or intelligence acts upon masses of these particles to produce objects we see. He said the Moon had mountains and shone from reflected sunlight and the Sun was made of hot iron constantly emitting light and heat. He proposed that there were an infinite number of elements.

Teleological, Design Argument

His “ordering force” to give sense to the changing Earth was the first iteration of the Design Argument, i.e., there’s no natural explanation for the order in the universe, so we infer some supernatural being must have designed it. Teleology is purpose. Aristotle later adopted and made the Design Argument well known. If, like most arguments for God, is an inductive argument where the conclusions are not certain but depend on how good their premises are.

He said, “Nothing can be known; nothing can be learned; nothing can be certain; sense is limited; intellect is weak; life is short.” Similar to Anaximander, he believed that Man and animals sprang from moist warm clay. His answer to Thales’s question for something that does not change?) 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 him at his trial and he was saved but he was forced into exile. He said that the Sun was the size of southern Greece.

Sophism

Sophism, Secular Humanism

Sophists as to the gods

Sophists argued against the gods as mythical abstractions with human qualities i.e., anthropomorphic. They were the first to introduce a dualistic explanation of the universe. They taught that the Sun was the size of southern Greece. They tried to explain meteors, eclipses, rainbows, the Sun, etc. rationally. They were the first philosophers to describe a conflict between science and the supernatural. They saw a fallen meteorite and concluded that the heavenly bodies were not gods but lumps of metal like on Earth. They taught Pericles the Orator, who ruled Athens from 460-429 BC.

Sophists as to the gods

Sophists as to the gods
that self-interest was the only valid end. He was also first to systemize the study of grammar, parts of speech, etc. In Concerning the Gods, he wrote, "As to the gods, I cannot say whether they exist or that they do not." He did not seek to prevent anyone from worshiping the gods as it was a politic thing to do and made for a stable society. Sophists were probably the first Empiricists in Western philosophy. Empiricism/experiment is not a static concept. Within empiricism 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.

**c449 BC** Concurrently, Rome prospered, copied Greek culture but kept its own language, adopted Greek gods (Zeus became Jupiter, etc.), philosophy, drama, the Macedonian order of battle, Spartan armor, & modified the Greek alphabet. Romans studied Solon's laws, & around 449 BC, codified their 12 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 12 Tables of the Roman Republic. Gods were sacrificed to for the sake of state.

**c440 BC** Empedocles (c490-c430 BC), born in Sicily, said air was a separate substance. He originated the theory of the four classical elements, earth, air, fire, & water (propelled by the opposite forces of love & strife), which made all matter when mixed in different proportions. Love & strife explain change. He illustrated centrifugal force by twirling a cup of water around. Twirling simply disrupts a moving object's tendency to continue in a straight line, inertia. He said that the Moon shines by reflected sunlight, that the speed of light is finite, that the gods should not be imagined as having a human form. He believed in reincarnation. He recorded his thoughts in verse.

**c435 BC** The Age of Pericles (c495-429 BC) was the greatest time in Athenian history. Pericles ruled from 460-429, Due to him, Athenians became deeply attached to their democracy, which, as noted, excluded women, resident foreigners, & slaves. Pericles made Athens powerful & the center of art & literature, & was responsible for the Parthenon (temple on the Acropolis, completed in 432 BC) & other great works. He decreed that Athenians could not marry foreigners.

**c430 BC** Philosophy: Democritus (c460-c370 BC) of Abdera, a contemporary of Socrates, student of Leucippus, father of materialism, traveled widely (Egypt, Ethiopia, India). He said, "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' question by postulating that: 1. Everything is made of tiny discrete particles called atoms (Greek, atomos = indivisible) 2. Atoms were perpetually in motion. 3. Such motion was inherent, and 4. Weight was not a property of atoms (Incorrect). "Nothing exists but atoms and the void."There was no evidence for atomism until the 19th century. The best form of government is democracy... The wise man limits his ambitions to his abilities.

He and Leucippus thus postulated Atomic Theory, but it was a great insight. He also said that we live in an infinite universe, with many worlds. Atomism fulfilled Ionian philosophy. Said there's no purpose in nature. He felt that dreams of gods were evidence of some unknown force in the universe, but not gods.

Like Thales, Democritus speculated that a bright band in the heavens (known as the Via Lactea/Milky Way) was distant stars. (Galileo in 1610 confirmed it.) Democritus thought spiritual reality does not exist, that the soul & even thought was material. He wrote 70 books on math, ethics, history, music, etc. Only fragments of his writings survive. Democritus wrote a set of rules for behavior; be moderate in all things and cultivate culture, as the surest way to achieve the most desirable goal of life, cheerfulness. Atomism was the most modern theory advanced in the ancient world but forgotten for c2,000 years as it conflicted with Aristotle. He said democracy was the best form of government and "A wise man limits his ambition to his ability."

**c430 BC** Drama: Sophocles (c496-406 BC), the second great Greek tragedian, added a third actor into the developing tragic drama; wrote Oedipus. Said, "The gods plant reason in mankind, 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."

Drama: Euripides (c484-406 BC), third and last great Athenian tragedian. His gods were mortal, cruel, and selfish. 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. Those whom God wishes to destroy, he first makes mad... No one who lives in error is free.

**c425 BC** Diogoras, a Sophist & wit, most famous atheist of the 5th century BC. He revealed the secret rituals of the Eleusian mystery religion, so made it ordinary; 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. So he was sentenced to death. He fled to Sparta.

**c425 BC** Philosophy: Socrates: Athens in the 5th century was an open market for ideas, with a middle class eager to learn.
Before Socrates, Greek philosophers had focused on trying to understand the natural world, had disregarded the gods. Heraclitus had shifted the focus of philosophy to the nature of change. Then the Sophists (sophist originally simply meant teacher) and Socrates shifted the concerns of philosophy to the study of Man and his behavior.

Socrates

Philosophy. Ethics: Socrates: (470-399 BC) and his student, Plato, ignored the study of the material world and concentrated on abstract principles, raw thought, and the conduct of Man. Socrates was the first to promote the notion of ethics/morality. Socrates came from a middle class Athenian family, took no money for his teachings and questioned others, particularly Sophists and the elders of Athens.

425 BC

How we think: Like the Sophists, Socrates engaged in a relentless analysis of any and all subjects. While other Sophists sought to show that there was no absolute truth, no 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, as opposed to true knowledge, episteme. To make correct choices, one had to have correct knowledge. Knowledge was virtue, the supreme good. Ethical action follows from rational thought.

405 BC

How we think: To Socrates, knowledge came from doubting (Descartes 1637); wisdom was knowing what you did not know. 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).

Follow the evidence

Socrates thought that Protagoras's notion that Man is the measure of all things was vain and false. To him there was just one good, knowledge, and one evil, ignorance. Said, "Follow the evidence, wherever it leads...The unexamined life is not worth living...By knowledge, he meant the knowledge of the craftsman as well as 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 men to learn to live peacefully together. His needs were simple, “How many things there are which I do not want.”

Slavery

While slavery was an accepted institution in Greece (and all known cultures), its evil was known. Socrates, "Slavery is a system of outrage and robbery." Plato, Slavery is a system of the most complete injustice. Also Seneca AD 45.

Reason

To overcome the relativism of the Sophists and Heraclitus, Socrates wanted to find some immovable foundation on which to build the edifice of knowledge. He found it within Man, and he called it the psyche, the soul. The immovable point in this conception of the soul was, for Socrates, Man’s conscious awareness of what words mean. To know that some things contradict others, that justice cannot mean harming others, represented for Socrates an example of the type of knowledge one could attain just by using the powers of reason. To attain reliable knowledge, state a presumably obvious proposition and examine, through dialectic conversation precisely what it means. Socrates is not known to have written anything; what we know of him is from Plato’s writings, which were extensive.

Socrates & Plato disdained Athens’s democracy, 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, “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. (Protagoras had said that all men possessed “political arts” so all should participate in governing.)

Socrates divided philosophy roughly 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 judgement.
4. Epistemology, The study of knowledge. Do we really know anything, and if so, what, and how?
5. Metaphysics, The search for ultimate categories, to understand the ultimate scheme of things. (More 399 BC)


400 BC

In Hindu belief, Manu was the progenitor of mankind. The Code of Manu, “In childhood a woman must be subjected
to her father, in youth to her husband, when her husband is dead, to 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.”

c400 BC Hippocrates (c460-c377 BC) “Father of Medicine,” rejected divine causes of diseases, but tolerated the Greek gods.

c400 BC The Bhagavad Gita, Hindu sacred poem, in Sanskrit, described a talk between Lord Krishna & Prince Arjuna. One’s true self is one’s undying soul which is divine in nature. 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 descends into this world in human form to restore order. Sanskrit is similar to Greek and Latin in grammar and roots of verbs, suggesting a common ancestor for most languages across Eurasia, including the Celtic languages...

c400 BC Possible date of 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 8th century BC, with 100,000 couplets and long prose passages telling of “the great tale of the throne of Hastinapura in the Bharata dynasty.” (10 times longer than the Iliad and Odyssey combined). Unlike the Vedas which must be letter perfect, Mahabharata evolved by its reciters in language and style. Some concepts later appear in the Bible. The epic provides the first known discussion of the concept of a “just war” and establishes 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 Trial of Socrates Socrates continually denigrated Athenian democracy & common men. He so embarrassed Athens’s elders by his incessant questions that they tried him for impiety & corrupting the young, trumped-up charges, i.e., “Socrates acted wickedly, & is criminally curious into things under the earth, & in making the worse appear the better cause.” His “impiety” was disrespect for the gods of Athens. No overt statement of Socrates was alleged or mentioned at his trial.

399 BC His trial was a sign of the decline of Athens. He was tried essentially for practicing free speech, a principle purportedly venerated in Athens. Ironically, neither Socrates nor Plato favored free speech. There was no law against atheism. The oracle at Delphi said Socrates was the wisest man. Socrates said if so it was as he knew his own ignorance.

At his trial, the most famous trial until Jesus’. Socrates lectured the judges, “Are you not ashamed that you give your attention to acquiring as much money as possible, & similarly with reputation & honor, & give no attention or thought to truth & understanding & the perfection of your soul?” They convicted him & forced him to drink poison. He said, “The time of departure has arrived. We go our separate ways, I to die, & you to live. Which is better, God only knows.”

Euthyphro Dilemma: Socrates, before his trial, asked Euthyphro, “Is there a universal concept of goodness? Is an act moral in & of itself [independent of God; if so, God is just a conduit for moral knowledge], or because God commanded it?” [morality is based merely on God’s whim.] This dilemma undercuts the notion of revealed religion.

Western theologians have tried but not yet resolved this dilemma. It is irrelevant for atheists & agnostics. Moral behavior by primates infers morality doesn’t need a god. Cicero in 65 BC, said Socrates “was the first to call philosophy down from the heavens & to place it in cities, & even to introduce it into homes & compel one to inquire about life & standards & goods & evils.” Socrates’s, Plato’s, & Aristotle’s philosophical conceptions of the divine & ethics had great influence in Medieval Christian & 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.

c390 BC Geobotany: Chinese botanists noted that certain plants grew only in soil containing certain minerals, an idea unknown in the West until c1600. Students of Mozi, Chinese (c470-c390 BC) made the earliest attempt to describe inertia.

387 BC+ Philosophy: Plato (c427-347 BC), from a wealthy family, on Socrates’s death, traveled abroad & in 387 BC, returned to Athens & founded the Academy to research philosophy. He wrote Dialogues re the imprisonment & death of Socrates, with Socrates as principal speaker, and Symposium (on the nature of love). Plato rejected the world of sense in favor of the self-created world of pure/raw thought. Most of Plato’s writings were of conversations with Socrates. Their ideas were almost indistinguishable. Plato believed that a Demiurge, a minor god, shaped the Earth.

Plato: 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 in the Orphic mystery religion. Justice and virtue are about the inner state of one’s soul. Christians later developed this into one’s conscience. Plato found it 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 promoted discord. His relative Critias wrote a play wherein religion was an invented lie, to keep otherwise brutish humans law-abiding.

Great Age of math & science Plato’s theory of Ideas or Forms was his most significant philosophic contribution. It posited that everything we see, everything we observe with the senses, is no more than 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 & it is permanent & unchanging. He saw God as the essence of the Good. Said all claims must have valid bases. (later said by many, believers like Leibniz and skeptics, like Huxley, Russell.)
Plato started with statements he thought universally true, i.e., used deduction, not induction (see Aristotle 335 BC).

Plato denigrated Democritus’s materialistic thinking, wanted to burn his books. Philosophy is the acquisition of knowledge...for wonder is the feeling of a philosopher, and philosophy begins in wonder.

Plato developed an idealistic metaphysics which postulated an ultimate eternal & immutable reality of pure Ideas or essences. He felt that true knowledge can be obtained only by understanding Ideas or Forms. Universals like “good” and “catness” were Plato’s answer to Thales’s question. Philosophically, it’s OK. As science, it’s useless. Reason was judgment based on good evidence. Knowledge through the senses was inferior to intuitive knowledge.

Plato said the soul had 3 parts, a rational reasoning part that produced wisdom, a spirited energetic part that produced courage, and a desiring appetitive 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. In The Republic (360 BC), Plato said that the Idea of the Good is the child or offspring (ekgonos) of the Good, the ideal or perfect nature of goodness, and so an absolute measure of justice.

He maintained that phenomena perceived by the senses are just imperfect copies of the reality of external Ideas. “Catness” is the essence of a cat. Beauty was a Form, which objects (or people) can sometimes attain. This was confusingly called realism. In contrast, Nominalists said that abstract concepts like “red” and “good” were mere “names” and that the only real things were real things. 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.”

Political Theory: Plato was the first known political theorist. Plato grew up in Athens in a time of questioning about all human relationships. Athens was nominally a democracy (of free male citizens.) Sparta was a military dictatorship of warriors. Socrates and Plato assumed Man was the most important being in the world & atheists should be killed.

Plato’s Republic is the first known book on political theory. He said to participate in civic life was a citizen’s highest aspiration. The Republic is a 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. The state is the soul writ large.

He said, God is the author of not all but only a few things, for few are the good things in life, and many are evil.

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Plato distrusted democracy. Political theory: Plato’s ideal society was ruled by philosopher-kings 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, i.e., a rigid class society. Marriages would be arranged so that the best breeders would come together and improve the genetic stock. Each person contributes what he does best, not interfering with others’ roles. To be a philosopher / king would be an economic step down, as kings have no wealth. Plato did not question the legitimacy of the non-philosopher / kings who then ruled Athens, a cop out. Aldous Huxley took The Republic to its logical conclusion in Brave New World in 1932.

Plato said that motion in the world and the Cosmos was “imparted motion” that required some kind of self-originated motion to set it in motion and maintain that motion. He posited a cosmological argument with a “ demiurge” of supreme wisdom and intelligence who created the Cosmos. He also said that there was a Great Chain of Being with God at the top, then Man, then animals to plants. This was the most common way of seeing the universe for 2,400 years. It put everything in its place. The universe is rational. Like educated Greeks, Plato believed the Earth was a sphere.

He said that impiety should be punished by 5 years in prison, death for a second offence. This is obscenely harsh by modern standards but human life was not as valued then as it is today. His second great idea was equality of opportunity. He said women could be trained as warriors like men.

Using Socrates’s dialectic, Plato looked into the natural world using abstract and theoretical concepts, rather than investigation & the derivation of a hypothesis to explain it. He and Socrates felt that experiment & observation (empiricism) were not only irrelevant but positively misleading in the search for knowledge. This slowed the progress of science for centuries. Plato’s theory that true or perfect reality could only be discovered through contemplation or revelation readily became, through the teachings of St. Paul, cAD 45, a cornerstone of Christian thought.

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of the wall. If taken outside the cave, Man 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. After death pious persons’ souls went to a beautiful place. Plato & Socrates considered almost all the great questions philosophers later discussed.

**Problem of Evil**

Plato brought philosophy to its maturity. Plato’s 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. Plato & Aristotle 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 of some sort. Plato (and later, Augustine, Aquinas, Kant, Descartes, & Spinoza), sought inconclusively to reconcile religion with reason. Regarding the evil in the world, he said that God did his best but could not create a perfect no-evil world. That is, God was not omnipotent.

**c375 BC** Sisyphus, cruel and crafty king of Corinth, said, “He is said to be a wise man who invented God.”

**c370 BC** Eudoxus’s Phaenomena, described numerous star constellations. It became widely consulted.

**c350 BC** Heraclides, pupil of Plato, credited with saying that Earth rotated, suggested that Venus & Mercury orbited the Sun.

**Lao-Tsu** Philosophy, Lao-tzu: Tao/The Way/The Path, developed in China, without a deity. 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 Xiuzeun and Xiushen, as a preparation for the spiritual transcendence thereafter. The Tao is the infinite potential energy of the universe. Qi is vital energy/matter 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.”

**c340 BC** Philosophy: Diogenes (412-323 BC), exemplar of the Cynic school of philosophy (almost the opposite of the current meaning), held that happiness consisted in the satisfaction of one’s basic needs and decried the pursuit of wealth.

**Cynics**

“I am a citizen of the world.” Love of money is the mother of all evils. He sought virtue and moral freedom in liberation from desire, only mastery of one’s self. Cynics disdained democracy, worshiped no gods, rejected all of civilization’s comforts and customs. Diogenes did not want (or have) anything so he did not lack anything.

**Philosophy: Meng-tzu / Menicus (371-289 BC) slightly altered Confucianism** by arguing that the ultimate justification of rulership was the welfare of the people. Every man 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 man relies only on his sense perceptions without subjecting them to the control of his mind, he falls into evil ways and perverts his original nature. He said that one who practices the principles of harmony and righteousness with sincerity radiates the spiritual influence of the universe.

**c335-323 BC** Aristotle (384-322 BC), the founder of life sciences, a Macedonian doctor’s son, Plato’s pupil for 20 years. On Plato’s death in 347 BC, he traveled, founded several schools, tutored Philip of Macedonia’s son Alexander for 3 years, then, in 335 BC opened his Lyceum in Athens devoted to natural philosophy / science.

Plato’s Academy had ignored science. Aristotle came at the end of Greece’s creative period, and it was c2 000 years before the world produced any scientist near his equal. He taught at the Lyceum just 12 years. During his time away from Athens, he did most of the scientific thinking for which he is known. 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. He said philosophy is the science of the universal essence of that which is actual. He & Plato both regarded philosophy as concerned with the universal. Aristotle’s universal was in things rather than Plato’s universal in abstract ideas.

**Basic laws of thought**

How we think: Aristotle posited three basic laws of thought (whose aim is truth). These laws are fundamental axiomatic rules upon which rational discourse itself is made possible.

1. the law of identity A is A. Plato is Plato. This assumes but does not prove that A exists.
2. the law of contradiction B cannot 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. A proposition is true or not true.

Leibniz (1710), Kant (1751), and Schopenhauer (1819) later proposed modifications to these basic laws of thought, which nevertheless remain valid.

In Aristotle’s ethics, every virtue is a mean between two extremes, which are vices. Contrary to Plato, Aristotle believed that knowledge comes only from the senses. To Aristotle, philosophy was reasoning. In ethics, he stressed that virtue is a mean between extremes (The Greeks’ famous golden mean) and that Man’s highest
Aristotle said that precisely defining terms was Socrates's main contribution to philosophy. In *Organon*, Aristotle's 6 works on logic, he said that Man could reason about the world. His studies and writings covered almost all the then known natural philosophies / sciences. They constitute one of the most amazing achievements ever credited to a single mind. He made the study of natural philosophies respectable.

Aristotle said that to be educated is to know enough to distinguish between sense and nonsense in all areas of knowledge, not to know everything. For Aristotle, experience was the sole basis of knowledge (Empiricism).

Every-thing, Man, dogs, rocks, plants, have a purpose

Teleology: Aristotle incorrectly believed that purpose was the fundamental mover in science. He said that all actions of plants and animals had a goal / telos / purpose, which was some good. He said, "Nature makes nothing without some end in view, nothing to no purpose; it must be that nature has made all things specifically for the sake of Man." Plants and animals grow to fulfill themselves. An acorn, for example, 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." Aristotle's lectures were transcribed in about 150 volumes. 50 have survived.

Thomas Kuhn (1962) showed that Aristotle's view of nature, his paradigm, i.e., there's a "purpose" to natural events had caused him to make many errors about the natural world. (Aristotle's errors p. 26). This paradigm persisted for around 2000 years, For him the meaning of life involved achieving eudaemonia (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." He said the telos / goal of human life was happiness.

How we think Thinking about a phenomenon and coming to a conclusion about it is the most natural & elementary of mental processes. In any given situation, one amasses in one's mind, consciously & unconsciously, all one knows & believes (even false beliefs) about the situation & comes to a conclusion. Aristotle analyzed this natural thought process that men had been doing for millennia and formalized it into Systematic Logic, his most influential achievement, the discipline of dealing with the principles of valid inferences.

Logic

Logic is the systematic building of ideas from other ideas. Scientific knowledge comes from syllogisms, where known premises (with a common term) produce a correct conclusions. Logic is a process, not a body of knowledge.

Premises may be explicit / expressed or implicit from the context of the syllogism. Premises may be universally true or simply a purported statements of fact. Of course a premise may be thought to be universally true but still wrong.

Aristotle then divided Systematic Logic into Deduction and Induction. Deduction and Induction are both syllogisms...

Deduction

A Deduction's syllogism's premises are universally true statements. They thus reach a universally true conclusion. For example, first premise: All men are mortal; Second premise, Socrates is a man; Conclusion, Socrates is mortal. Deduction is used in geometry and is considered a great Greek intellectual achievement.

One or more of an Induction's syllogism's premises are simply purported statements of fact, not necessarily universally true. Aristotle described Induction as "an argument from particulars to the universal," but much preferred deduction. The more accurate the premises, the more valid the conclusion. Example:

First Premise - All trees I have seen in Wyoming are pines.
Second Premise - I have seen a lot of Wyoming. (There can be many premises.)
Conclusion- All trees in Wyoming are pines. (This is an inference, not a deduction)

The conclusion is reasonable, possibly but not necessarily true, as the second premise was not sure enough.

Induction and deduction are merely reaching a conclusion based on available evidence (premises). Like the schoolboy who learned that he had been talking in prose all his life, persons now learned that they had been thinking in induction and deduction all their lives. Aristotle's book *Organon* developed and refined the study of logic and demonstrated how one could establish the validity of a line of thought.

Aristotle over-emphasized deduction, because he wanted certainty. "To be acceptable as scientific knowledge, a truth must be a deduction from other truths." *Nicomachean Ethics* 6.

Hume also distrusted Induction (1739). But Induction came to be more useful to science.

People make numerous different kinds of errors in their common thought, called logical fallacies. See p. 190.

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 of the arts.

Categor-ies of science

Matter + form = reality

For Aristotle, matter and form were the two essential components of reality. Matter remains what it is even as it assumes new forms. A substance is a combination of both form and matter. Matter does not exist by itself, nor does form." He said matter is pure potentiality and form is what matter becomes when it becomes anything. (Example, marble is matter; the statue carved from it is form).

Aristotle also distinguished between essential and accidental properties of things. Essential properties are
properties that determine what a thing is, i.e., an apple, while accidental properties determine how a thing is, such as big or small or green or red. Aristotle 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.” This is an ultimate solution to Thales’s question. Real things are real things and there’s nothing else.

**Empiricism**  
Aristotle said empiricism (experiment and observation), was the best method of gaining knowledge. (Feynman: The test of all knowledge is experiment. Experiment is the sole judge of scientific "truth.")  
As an observant scientist, Aristotle described the birth of bees in a hive, he investigated the pairing of insects, the courtship behavior and mating habits of birds, the behavior of drones in a beehive, that a cuttlefish 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. He founded anatomy, embryology, and physiology. He described the internal anatomy of shellfish, fish, and squid. Until Plato and Aristotle, Greeks had principally studied Homer’s epics for knowledge in all areas.

To the question, “Why do cats have kittens?” Aristotle said, “There’s a Formal Principle which passes from the parent to the child.” This is as useful as Plato’s “catness;” it doesn’t answer what the formal principle is. But it was accepted for centuries. This 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.

**Political Theory**  
Aristotle’s fundamental ideas were much like Plato’s; they disdained democracy, but he added an empirical, inductive method, which marked the beginning of political science away from ethical and philosophical musings about the state. Where Plato saw the state as originating from the necessity of division of labor, Aristotle saw the state as organically evolving from the household. A husband rules his family as a monarch rules his subjects, due to his superior intelligence. He believed that slaves had no intelligence at all, a shameless rationalization of class prejudice. He perceived that the ultimate political problem was to strike a balance between liberty and authority. The goal of the state was to produce cultured gentlemen. A virtuous king is the best form of government.

335 BC Aristotle criticized Plato’s cold Republic for ignoring the complexity of society, the pleasure of ownership, of family, of participating in ruling. Aristotle’s Metaphysics coined the word physics from the Greek word for nature. Where Plato developed a world in which the physical natural philosophies had little if any real reason to be, Aristotle developed a world where such sciences were developed largely by observation of what is, but also based on speculation on what ought to be. Both taught that the highest occupation of Man was the discovery of nature’s laws.

In Politics, he said, “Inequality is the source of all revolutions: no compensation can make up for inequality...Democracy arose from men thinking that if they are equal in any respect, they are equal in all respects...A democracy is a government in the hands of men of low birth.” But also said, “The only stable state is the one in which all men are equal before the law, a democratic state.” But, “Man is by nature superior to the female.”

Long before Machiavelli (1532) and George Orwell’s 1984, Aristotle said that for a tyrant to retain power, he should kill any rival of merit, prohibit common meals, literary assemblies, potentially dangerous education, he should employ spies, keep people busy with war or great works, and feign piety. Aristotle criticized the communism of Plato’s ideal state. Said there are two claims to power, the rights of property and the welfare of the greatest number (utilitarianism).

Aristotle said, “Man is by nature a political animal, meaning only Man could make communal living possible. He distinguished between kings who ruled by an admitted & inherent right & tyrants who ruled without the consent of the governed. He believed the city state was the ideal form of political organization with separation of powers. Slavery was necessary & just; 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 appropriate to their nature.

His great contribution to law was to say epieikeia / equity / fairness had to be a part of any legal system. He said there is a Scale of Being with minerals at the bottom & Man at the top, similar to Plato’s chain of being. Aristotle said that under unequal economic conditions, the poor would view the state as a conspiracy against them and would see no reason to follow the rules. Similarly the rich would come to feel that they were better than their fellow citizens and see themselves above the law. Aristotle said, “We must regard every citizen as belonging to the state.” (Contrast Kant in 1755; “Every human being is an end in himself.”) Aristotle also said the oft quoted, “Necessity knows no law.”

Aristotle’s crowning achievement 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. Said, “Fear sways man more than reverence.”

Aristotle established different methods and different criteria of knowledge for different subjects. His many books were taken around the known world 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. The world is rational and Man can understand it. Now there was a new paideia / curriculum for all (all male citizens) to learn, i.e., science. The spirit of inquiry exploded as the seafaring Greeks exported it. Greek was the language of the educated Mid East.
**Four causes in science**

Said, “True knowledge is the knowledge of ultimate causes. His *Metaphysics* named four causes 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.
4. Final cause, the purpose of the object, place to sit.

*Metaphysics*

Both Plato and Aristotle’s arguments were based on the use of opposites in argument (dialectic) and the self evident nature of geometric forms. In *Metaphysics*, Aristotle said that true knowledge is the knowledge of ultimate causes. *Metaphysics* comes from chapters in Aristotle’s writings after a chapter on physics but came to be known as the science of things transcending what is physical or natural. *Metaphysics* is thus that branch of speculation dealing with first principles of things, including such concepts as being, time, space, cause, substance, essence, and identity.

**Aristotle’s God**

Aristotle posited his main argument for God, a Cosmological / First Cause / Prime Mover Argument. In *Physics* (VIII, 4-6) and *Metaphysics* (XII 1-6), he said that there is an underlying eternal world, no beginning, no end; so his first cause did not create the essence of the world but a Prime Mover / God organized it and all change traces back to a Prime Mover, who set it into motion. (This is akin to deism, 1624 and the Anthropic Principle, 1973).

**Natural Theology**

The Cosmological Argument is part of classical natural theology, the attempt to show the existence of a god through reason alone. Theology tries to show the existence of a god through faith or revelation. 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, usually a god. Natural theology arguments can provide a foundation for rational theism but don’t obviate the contradictions inherent in the Christian / Muslim God.

**God by Default; Common Sense**

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

**Earth is a sphere**

Like Plato, Aristotle said the Earth was a sphere. In Egypt he had seen stars there that “were not seen in northerly regions,” which could only occur on a curved surface of the Earth. He conceived the concept of the golden mean.

**Aristotle errors**

Aristotle dominated Western science for c2,000 years. Despite his greatness, he erred often. Namely, he believed:

1. All matter is made up of four earthly elements, water, earth, fire, and air, and a heavenly element, aether. He didn’t accept Leucippus’s atomic theory, and, due to the deference given Aristotle throughout history, Atomism was ignored for 1,000 years. (Feynman said atomism is the single most important scientific idea.)
2. The brain cools the blood and is unrelated to thinking. 3. Men have more teeth than women.
4. Air weighs nothing 5. Rainbows are caused by clouds acting as a huge lens. 6. The speed of light is infinite.
7. The speed of light was faster than the speed of sound as seeing was more noble than hearing.
8. Heavy rocks fall faster than light rocks. (Philoponus, Galileo, Newton, & others all showed this was an error.)
9. Aristotle & Eudoxus originated geocentrism, Earth is the center of the universe; i.e., the Moon, Sun, planets (& stars circled the Earth on four crystal spheres. Ptolemy, astronomer, cAD 150, agreed.
10. There was a purpose to natural events, i.e., rocks fell and water ran downhill seeking their “natural” place.”
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 & animals.
14. His idea of a Prime Mover/First Cause for the universe was not fully refuted until the 18th century.

These incorrect scientific beliefs slowed the development of physics for c2,000 years, esp. the concept of purpose.

**Regarding human affairs, Aristotle mistakenly believed:**

15. Slaves deserved 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.,, Rulers are justified as they are rulers (also circular reasoning,) makes the Royal Lie a theory of injustice. Plus, Negroes came from hot climates, which fostered indolence. In Nicomachean Ethics, he wrote, “Watch virtuous men to learn virtue.” a Fallacy of the Consequent (see page 190 for logical fallacies)
16. As a corollary to the concept of natural slaves, war was OK to capture natural slaves.
17. Women were inferior, “on account of a kind of inadequacy.” Thus they must be subordinate to men.
18. Foreigners were inferior as they did not speak Greek. (fallacy of the consequent)

His theories of women’s inferiority and “natural slaves” helped justify slavery and the subjugation of women for c2,000 years. The Old and New Testament and the Koran had the same attitudes toward women and slaves.

Philosophy: Four schools of philosophy flourished in Athens, the Academic (Plato), Peripatetic; Aristotle walked
around as he taught, hence Peripatetic. Epicurean (Epicurus, 300 BC), and Stoic (Zeno 300 BC). Most of Aristotle's and other Greek works were lost to Christian Western Civilization during the Dark Ages.

Alexander (355-323), Macedonian, Aristotle's former pupil, then conquering the known Western world, sent Aristotle reports and zoological and botanical samples, and put 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.

Epicurus (c341-270 BC), from Samos, a student of Democritus, a materialist and atomist, set up a school in Athens called The Garden. It accepted women (other schools didn't), 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.

Epicurus and Zeno of Citium began the birth of Greek Individualism, one of the 3 great turning points in Western political theory. Rather than seeing Man as a part of the polis, he was seen as an individual, 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, & that superstitions / religion and the dread of death caused the greatest fear. The other chief obstacles to happiness were fear of death and fear of pain. They also said that organs develop from exercise and weaken when not used (correct).

Pyrrho of Elis (365-c275), 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 at all, which of course is easy for most people. Pyrrho's philosophical skepticism is the most extreme school of skepticism. In its most extreme form, philosophical skepticism says not only could we not know anything, we couldn't know that we couldn't know anything.

The Mauryan dynasty, the first Indian empire, began when Emperor Asoka unified India, adopted Buddhism, and started India's golden age. He proscribed respect for the dignity of all men, and above all, religious tolerance and non-violence. The Hindu Brahmins did not give up and eventually ousted Buddhism from India cAD 150.

Philosophy: Epicurus (341-270 BC), from Samos, a student of Democritus, a materialist and atomist, 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.

Epicurus said, "The gods can either take away evil from the world and will not, or, being willing to do so, cannot, or they neither can nor will, or lastly, they are both able and willing. If they have the will to remove evil and cannot, then they are not omnipotent. If they can but will not, then they are not loving. If they are neither able nor willing, then they are not omnipotent. Lastly, if they are both able and willing to do away with evil, how does it exist?"

This problem dates from the Sumerian Poem of The Righteous Sufferer c2000 BC and from the Hebrew Bible’s story.
Problem of Gratuitous or Unnecessary Evil or Suffering

As some minor pain/suffering can reasonably be seen as necessary to avoid a greater pain, i.e., get singed by a hot stove that prevents a worse burn, the problem is more accurately stated as the Problem of Unnecessary or Gratuitous Evil or Suffering, but is known commonly as the Problem of Evil. One can certainly argue that there is no bright line between necessary and unnecessary or gratuitous, but this does not negate the fact that there are certainly abundant examples of evils & sufferings in the world that have been unnecessary and gratuitous by any conceivable criteria.

The monotheistic Christian, Jewish, and Muslim Gods all are claimed to derive from Abraham, thus are referred to as the Abrahamic God. They are all claimed to be, inter alia, as loving, benevolent, omnipotent, and omniscient.

c300 BC

Given its premise, the Problem is the logical negation of the existence of the proposed Abrahamic God. Biblical & Muslim theologians recognize it as such and so have devised many arguments attacking the premise. The most common attacks accept the abundant factual existence of evils & sufferings but argue that God, allows evils & sufferings for some morally sufficient reason. Leibniz’s Essay on Theodicies (1710), articulated several purportedly morally sufficient justifications that God had to permit evil & suffering. He called them theodicies. (See them at 1710 & at “God, arguments against” in the Index & Glossary). There are other arguments, such as:

 Proposed defenses to the problem

Retribution Defense: Hebrew Bible, God OKs evil & suffering as it’s retribution for man’s sin, or a test of faith (Job).
Free Will Defense: Augustine (AD 414), Aquinas (1273), Francisco de Vitoria (1536), Leibniz (1710), CS Lewis (1940), & Plantinga (1974,1993) all argued variations of the defense that God gave Man free will, so evil is inevitable.
Hinduism: One’s suffering is due to one’s bad deeds in this life or a previous one, People get what they deserve. Some argue evil & pain are in this world only, and it will be sorted out in the afterlife.

There’s no Evil defense

Evil doesn’t Exist Defense and related arguments; Spinoza: Evil doesn’t exist as everything is part of one reality.
Aquinas: (1273), posited four arguments, Evil is not a thing; Man can’t understand why God does things (Man is too dumb); We can’t say all suffering is bad, and: Man has free will including to do evil.
Calvin (1536) & Jesuit G H Joyce (1923): Evil & suffering is OK as all events are part of God’s good plan. But, would it really disrupt a loving God’s plan for the world to give all humans good health, eyesight, hearing, and mental health?
Plato, Aristotle, and Plutarch: God can only be good, and good and evil are two distinct metaphysical statuses, where evil was reducible to some other thing than the good, but also somewhat subordinate to good.
Augustine (AD 414): Evil can only exist in a body which is a greater good. (But, Christianity and Islam are so committed to the existence of evil that any reason to reject evil would be a reason to reject these religions.);

Man is too dumb defense

Man is too Dumb Defense: Pseudo-Dionysius (c500) & Aquinas: (1273), What God does can’t be comprehended by man. Leibniz (1710): Apparent evils are only thought to be evil due to man’s narrow human perspective.
Skeptical Theists: (1990s) Man must be skeptical of his ability to understand God’s big picture.
It’s a Mystery Defense: Some theologians simply say evil is a mystery. The mystery of Evil. (Rev. Robert Sirico).

Other arguments

Gregory the Great: Evil is a mystery, so man has no basis to challenge God’s actions; & suffering tests one’s faith.

Man has OK’d all past evils & sufferings

Other defenses: Pantheists say God is immanent in the world and working to bring good out of evil, though evil, despite God’s efforts, will continue to exist. Bart Ehrman’s 2008 book, God’s Problem, How the Bible Fails to answer Our Most Important Question-Why We Suffer, says the Bible gives several unpersuasive & contradictory arguments trying to refute the Problem. Kant (1781) said all theodicies fail and evil is to be overcome by will and discipline.
Malebranche: God permits evil to get the best balance between perfection & the simplicity & generality of its laws.

For any theodicy to be theologically adequate, it must apply to all unnecessary or gratuitous evils or sufferings. Thus the Abrahamic “God” has OK’d every unnecessary and gratuitous evil and suffering that has plagued mankind since day one.

All these arguments for the Western Abrahamic God are discussed more fully in this history as they have appeared in history and are also summarized in the Index and Glossary under “God, arguments for”, and “God,
arguments against." All the justifications, defenses, & explanations for evil proposed so far have proved inadequate, so the Problem of Evil remains the logical negation of the concept of the Western Abrahamic God.

The Problem of Evil does not refute every kind of a god, only those with claimed supernatural powers that are refuted by the reality of evil & suffering of the world. The number & variety of arguments trying to get around the Problem of Evil illustrates Miles’s Theorem, “The weaker the case the longer the brief.”

C300 BC Philosophy: Zeno the Stoic of Citium (c335-263 BC), set up a school in Athens and taught that as one couldn’t change much in life, happiness consists of conforming one’s will to divine reason, accept one’s place in the world. This was more demanding and more influential than Epicureanism. Stoics / materialists’s most important political contributions were their ideas of universal law and 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 & happiness is surrendering the self to the divine order of the cosmos, living in harmony of nature. This prepared the way for Christianity, contra the Greek emphasis on Man’s relation to the polis. Everything had a purpose related to Man. Some animals one eats; others provide wool, etc. Cruelty affords Man the opportunity to exercise virtue. The mixing of barbarians and the eclipse of the city state after Alexander facilitated these ideas. To live in accordance with nature is to live in accordance with virtue.

Greek reason was limited Three concepts pervaded and limited great Greek thinking, 1: the idea that the city was the best political organization, 2: slavery was legitimate, and 3: Greeks had little to no knowledge of the world beyond the Med. Also limiting Greek thought were lack of tools to measure which are essential to studying the natural world. Greeks had no clocks for short time intervals, no telescope, no microscope, no accurate scales, no really efficient numerical notation. (Greeks had seen the arch, but used it only for sewers, and, as seafarers, never appreciated the importance of roads.) Edith Hamilton (The Greek Way) said, “The fundamental fact about the Greek was that he had to use his mind. The ancient priests had said, “This far & no farther. We set the limits on thought.” The Greeks said, “All things are to be examined and called into question. There are no limits on thought.” Most Greek philosophers believed in astrology.

Ptolemy Soter Science, Library of Alexandria: Ptolemy 1 Soter c334 BC founded and supported a museum (temple of the muses) in effect the first university in the world, with c500,000 scrolls, the birthplace of modern science. All books in Egypt and all books brought into Egypt were hand-copied for the Library. (There were many Ptolemys.) In two generations, it outshone Athens. Alexandria became the intellectual capital of the Western world. Jews were welcome there. Its scholars included Euclid (geometry, below), Hero (AD 50, designed a primitive steam engine), Eratosthenes (below), Herophilus (studied the brain's functions, dissected humans, discovered nerves, described the optic nerve, & founded a medical school, which became as famous as the Library), Appolonius (mathematician, below), Hipparchus, (140 BC astronomer), and Archimedes (220 BC). Tomocharis compiled a list of stars.

Alexandria became the largest Jewish city. Ptolemy also established a temple, called the Serapeum, which had three gods, 1. Serapis, 2. Isis (the Moon cow goddess), and 3. Horus, the child god, with the idea of immortality predominant. Printing was not yet developed. Face to face and hand-copied letters were the only way scholars communicated (Later, under Rome, Alexandria also became the greatest trading center in the West.)

Euclid The Pythagorean Theorem became well known at Alexandria around 300 BC. Euclid did not invent 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 work in the history of mathematics. Euclid started with 23 definitions, 5 common notions, and 5 postulates. self-evident (presumably true) assumed axioms (parallel lines don’t meet, non-parallel lines in the same plane meet somewhere, etc) and then deduced 467 theorems, all derived from the basic axioms. Appollonius of Perga soon devised 487 theorems. Euclid also said that the Earth was a sphere. His reason, the most harmonious geometric form was a sphere.

c270 BC Dogma vs. reason, astronomy: Aristarchus (310-230 BC), born in Samos, scholar at Alexandria library, suggested that the Earth revolved and also orbited the Sun which was 300 times bigger than Earth (see Heraclides 350 BC). This was not widely accepted. It was called blasphemous. Muslim scholars later also hypothesized about this heliocentric theory, but, as it was contrary to Aristotle, it was ignored for 18 centuries until Copernicus revived it.

c265 BC Rome ruled all Italy. 300,000 persons were under Roman control. Romans developed the arch (semicircular until the pointed Muslim and Gothic arches); used it in bridges, aqueducts, buildings. (The Pantheon had a span of 164 feet.) Romans first enslaved conquered people but found that making them citizens worked better (see Force, Fraud, Favor at 1532). Rome began the barbaric gladiator games. Water mills to grind grain were used by Greeks as of the third century BC and by Romans by the first century BC.

250-225 BC Ecclesiastes, (Greek for Koheleth, a teacher), the shining jewel of the Bible, was reasonable, hopeful, said good people suffer & 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, nor bread to the wise, nor riches to the learned, nor favor to the skillful, but time & 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 & do good 3:12. Live joyfully with the wife whom thou loveth all the days of the life of thy vanity.” 9:9 “Eat, drink, and be merry.” 8:15.
Unlike Job, *Koheleth* doesn’t argue with God. The only way to real peace is to accept that there is no real justice.

### c250-210 BC

**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, may have finished the Great Wall (1,500 miles, and with hundreds of thousands of soldiers guarding it) to keep Mongol horses out. (Mongol soldiers could easily scale the wall, but Mongols fought on horseback.)

Most importantly, he abolished feudalism, introduced bureaucratic government, but not on *Confucian* principles, control of the economy, and belief that most knowledge is dangerous. He caused all books but those on law, herbal medicine, and farming to be burnt. China was then the largest nation. Chinese used seed drills and iron plows. China’s centralized nation state pre-dated any such state in Europe by over 1000 years.

The two basic ideas in science in China were 1. that there are 5 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). Chinese reported *Halley’s* comet in 240 BC. (Comets, shooting stars, eclipses have through the ages been considered signs from a supernatural power.) There was no contact between China and the West. Chinese developed a harness where the horse’s chest, not its throat, pushed; not used in the West for c650 years.

### c240 BC

**Eratosthenes** (276 -194 BC), (from Cyrene (Lyibia) in Africa), 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 500 miles away in Alexandria, at precisely the same time, it was angled 7.2 degrees from the vertical. He realized this could only come if the Earth were a sphere. (He was high by only 16%, if he used the Attic *stadion* as a measure.) He also mapped the Nile and drew a map of the known world with lines of latitude and longitude.

### c220 BC

**Archimedes** (c287-212 BC), born in Syracuse, Sicily, an Athenian colony. At the Library of Alexandria, he was a hydrologist and mathematician; he realized that one can calculate the volume of an irregular shaped object by *submerging* it in a fluid and measuring the increase in volume of the fluid. Similarly, a *floating* object weighs the same as the fluid it displaces. So one can determine the relative density of an object by comparing its weight to the weight of water it displaces (*Archimedes’s Principle*). He worked out the mathematical law of the lever (force multiplies by the ratio between the lengths of the two arms. “Give me a firm place to stand and I will move the Earth.”). He also calculated 3.1418 as the value for $\pi$ by using 96 polygons, very accurate. [$\pi = 3.14159265+$] He invented the compound pulley, and figured out the formulas for the surface area and volume of a sphere. Formulas he deduced were:

- **Volume of a sphere** = $4.189 \times 1 \frac{1}{3} \times \text{radius cubed}$, or $2/3$ that of a cylinder with same diameter and height.
- **Surface of a sphere** = $12.566 \times (4 \times \pi)$ x radius squared or $4\pi$ a circle the same size.
- **Volume of a square pyramid or a cone** = $1/3 \times \text{the area of the base} \times \text{height}$.

Archimedes wrote about the water screw then used in irrigation to raise water. It was thus later named after him.

### c200 BC

Comparing Rome and Greece: Greeks saw the world as a question to be answered. Rome had virtually no indigenous culture. All its culture was derivative from Greek. **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 young, 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: Law, Roads, Citizens**

- The keystones of the Roman Republic’s success were law, citizenship, and roads. Whereas Greeks were concerned about abstract standards of justice, Romans wrote their 12 Tables of laws, used until fall of Rome, cAD 410, and in the Eastern Roman empire (Constantinople) until 1453, when it fell to the Muslim Ottoman 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. 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.” Roman roads were so well built they can still be used. With water brought from the mountains by an aqueduct, Rome reached one million persons.

### c168 BC

**Antiochus 4**, ruler of Syria, severely persecuted the Jews, who revolted and won Jerusalem. Rabbis told Jews that Yahweh would eventually vindicate his suffering people, 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 in 240 BC, in 164 BC Babylonians saw the comet later named after *Halley*.

### c150 BC

**Philosophy:** *Carneades*, Head of Plato’s *Academy*, a less extreme *Skeptic*, replaced the Skeptic’s *know-nothingism* with only a more sophisticated theory of probability. He simply wanted proof before accepting an idea.

He expressed the *Problem of Evil* as, “The existence of God is not self-evident, and therefore needs proof... 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.” He said
that the widespread belief in a God did not prove that a God existed, just that many people had such belief. He disputed the Design Argument by naming errors in the world’s design, i.e., diseases, poisonous snakes, tidal waves.

He asked if reason was God’s greatest gift to Man (the Stoics argument), why did God distribute it so unevenly?

Astronomy: Seleucus of Seleucia said the Earth rotated and orbited the Sun; that tides were governed by the Moon.

c146 BC Greece in decline: The power of Greece had declined, and by 146 BC, the remnants of Greece were absorbed into the Roman Republic, becoming merely a backwater in the Roman sphere, but Rome adopted Greek culture.

c150 BC- AD 150 Background. These three centuries were the high point of classical civilization. The Roman Republic / Empire (as of 43 BC) grew to include most of the world Romans knew as the world, from mid-Scotland to the Caspian & Persian Gulf, and from Romania to the Sahara. Romans built 50,000 miles of roads plus bridges and aqueducts. The Segovia aqueduct, built cAD 100, ran ten miles, with hundreds of arches, laid with no lime or cement, still stands.

The Roman Republic did not include India, China, Japan or the Americas. It was the highest point that Western Man attained until the discovery of America. 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 India, Gautama, Zoroaster, Persia, China, Huns, or Africans. While there were many schools in the empire, there was little intellectual progress.

History after the Greek era is very largely the history of the three ideas: 1. Science, 2. Of a universal righteousness, and 3. Of a human commonwealth spreading out from the minds of the rare and exceptional persons where they originated. Men always faced the greatest political problem, i.e., how to live in peace and freedom. The Greeks usually chose freedom (at the cost of constant conflict), both with other Greeks and with others.

c136 BC China: The Han Empire was as large & rich as the Roman Republic & 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 c124 BC. Between 100 BC & AD 200, the Chinese made a seed-planting machine, rotary winnowing machine, rotary fan, and the wheelbarrow. Han Ying noted snowflakes were 6 sided, unknown in the West before 1611. Astronomer Liu Xin (46 BC-AD 23) calculated pi at 355/113, accurate to 5 decimal places.

129 BC Hipparchus, at the Library of Alexandria, made the first systematic catalog of 850 stars, calculated the length of a year and lunar cycle, the distance to the Moon, said the Earth was closest to Sun on Jan. 4, furthest on July 4, developed a scale of magnitudes for stars indicating their brightness; adopted the Babylonian 360 degree circle to Western math.

c100 BC How-to knowledge: Celts developed the iron plow. Romans used watermills to grind grain in the first century BC.

c65 BC Philosophy: Marcus Tullius Cicero (106-43 BC), Consul, leading lawyer of Rome, prolific author, philosopher, and letter writer, doubted the existence of supernatural powers, “I may ask for a rational explanation of religious faith.” In his On the Nature of the Gods, “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.” (The Argument from Contrariety / Contradiction) Also, “In the first place it is improbable that the material substance which is the origin of things was created by Divine Providence. It has & always had a force and nature of its own. That which we call Nature is therefore the power which permeates and preserves the whole universe... “The good of the people is the chief law.”

He did, however, like Napoleon, Frederick the Great, and Dwight Eisenhower, inter alia, think religion for the masses was necessary as a means of social comity. (See 1532, Force, Fraud, and Favors)

He didn’t convince enough Romans to save the Republic, but was the first person to see that a near-universal belief in a constitution will ensure peace and freedom. His 800 remaining letters provide the most important source of current knowledge of life in Rome. Cicero, in his writings, 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.

“Reason is the ruler and queen of all things.” He also said, “To live is to think... A house without books is like a body without a soul.” On slavery, he said, “By the grand laws of Nature, all men are born free and equal and this law is universally binding upon all men. And, “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; you have called men scattered about into the social enjoyment of life.”

He sought to resolve the conflict between peace and freedom by establishing a government of laws, not men. Like the Greeks, the early Romans chose freedom (over peace). Judea came under Roman control c63 BC. With Roman power consolidated, civil conflict arose. A series of ruthless men offered to be tyrant / dictator to secure peace, including Gaius Julius, later to be made Caesar / dictator.

58 BC Titus Lucretius Carus (c96-c53 BC), the most important Epicurean, was a proponent of atomism, wrote De rerum natura / On the Nature of Things, a book length poem, the greatest classical statement of atheism, which combined
Atheism, Evolution

It portrayed Epicurus (ref. 300 BC) as the great champion of rational thought. He argued that nothing is ever generated from nothing; nature consists of nothing but atoms moving in a void. He sensed qualities are produced by combinations of atoms of various shapes, sizes, and weights.

He depicted nature as a landscape of plants & animals transforming & progressing from primitive to more advanced stages across the ages, including human's rise from savagery to civilization, an early depiction of evolution. Nothing is ever generated from nothing; nature consists of infinitely small particles, always in motion and eternal. The combination & recombination of these particles connected Man to the universe.

The universe had no creator but was a collection of random events. To make it relevant & understandable to the people, his poem expressed forgiving yourself for being human; it’s better to love than to hate, to live fully, even if imperfectly. Man’s soul is composed of atoms, thus dies when Man dies. This contradicted Aristotle, his book was forgotten until rediscovered in 1473. The issue of free will versus determinism was important in Epicurean thinking.

c50 BC Gaius Julius (100-44 BC), Roman consul and general, conquered France/Gaul (Veni, Vidi, Vici) likely killing one million and enslaving another million, and after a failing in 55 BC, invaded Britain again in 54 BC, but left shortly to quell a revolt in Gaul, had a short dalliance with Cleopatra 7, queen/pharaoh of Egypt (Cleopatra was a common name in the Ptolemy family). In 49 BC, Gaius Julius returned to Rome, conquered it and became Julius Caesar.

Julius commissioned the “Julian” calendar of 365.25 days, named July after himself. (Designed by astronomer Sosigenes of Alexandria.) Not changed until 1582, when it was off by just ten days. (A year is 365.2422 days.)

44 BC Brutus, Casca, Cimber, & many others murdered Gaius Julius in the Senate. He threatened their power. Mark Anthony, an ally of Julius, then inaugurated the system of institutional tyranny that was the Roman empire. (With Julius gone, Cleopatra 7 returned to Egypt, murdered her brother/pharaoh, and attached herself to Anthony.)

44 BC Ethics: Cicero’s last book, On Duties, dealt with common problems, how to treat inferiors, how honest must one be in business, 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 is wrong; a modest & profound directive, more understandable than Plato or Aristotle. Cicero also wrote that sure knowledge was impossible. Greek stoicism became the dominant philosophy among educated Romans. Cicero, Lucretius, Pliny the Elder (AD23-AD79), Marcus Aurelius, Cotta, a friend of Cicero, Sextus Empiricus, Vallevius, and Lucian of Samosota were atheistic regarding the Roman gods.

43 BC The Roman Republic (which had begun c500 BC), weakened & became the Roman Empire. Augustus / Octavian (63 BC - AD 14) and Anthony had Cicero murdered & nailed his severed hands to the Senate rostrum because Cicero had exposed Anthony’s attacks on Romans’ freedoms. Augustus/Octavian became Caesar.

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

c25 BC Virgil (79-19 BC) wrote The Aeneid as a national epic, which told of the wandering of Aeneas after the fall of Troy, ended up in Rome. As Homer’s epics did for the Greeks, The Aeneid taught Romans about their past.

cAD 1 The world’s population was roughly c300M, c60M in China. Chinese used porcelain, adjustable calipers, pendulum, and a water-powered bellows to work cast iron; said the solar year was 365.25 days, the lunar month 29.5 days.

cAD 8 Publius Ovidius Naso / Ovid (43 BC-AD 17), famous and prolific Roman poet, best known for The Art of Love, “It is convenient that there be gods, and, as it is convenient, let us believe there are.”

cAD 30 Religion, Jesus: Rome had conquered Judea in 63 BC. Judea had at the time many Jewish sects, some chiefly spiritual (like the Essenes), many that hoped for a military Messiah to liberate them from Roman rule. Several sects worshiped a god who had died and was resurrected, like the Osiris myth. Although there are non-Biblical references to Jesus, this history accepts that Jesus from Nazareth, an charismatic Jew, was one such messianic itinerant preacher.

What Jesus taught Biblical accounts (written 40 and more years after Jesus’ death) say he preached in synagogues & elsewhere a simple & profound doctrine of a loving universal fatherhood of God & the imminent coming of the Kingdom of Heaven, i.e., the end of the world. His teachings were not reasoned arguments like those of Socrates or Greek rationalists, but, like the Jewish God, commands from an omnipotent God. Many of Jesus’ teachings dealt with thoughts, sinful thoughts or good thoughts like “Love thy neighbor.” The Hebrew Bible’s commands dealt mainly (not exclusively) with actions, not thoughts. Jesus always considered himself Jewish. He gained many followers, and was thought of as a rabbi. For Jews, the notion of believing also grew around the time of Jesus as a criterion for being in God’s good grace. Such belief contrasted with Greek rationalism. The notion of a Jewish afterlife also developed around this time. Jesus accepted of the harsh Jewish laws in the Torah, Matthew 5:17-20, 15:4, Luke 16:17, and 29:9-15, Mark 7:9-
and considered to be impossible under the laws of nature.

A miracle? Miracles

Jesus’ death occurred and that a proponent of a miracle has the burden of proof that a miracle has occurred. Therefore, he is a god. (a Christological Argument). The logic is sound; if someone performs a supernatural act, a miracle, that someone is, by definition, a god of some sort. The Greek gods purportedly had various limited supernatural powers. The Western concept of the Abrahamic (Biblical & Muslim) God purportedly is omnipotent, omniscient, loving, etc. Skeptics of the supernatural question that a given claimed miracle actually occurred and that a proponent of a miracle has the burden of proof that a miracle has occurred.

Paul based his entire belief in Jesus as God on the proposition that Jesus came back to life. Paul said, “If Christ has not risen, then is our preaching vain and your faith is also vain.” 1 Cor.15:14 & 17. Hume in 1748 argued that a
bonds. A miracle has never occurred. Rationalists agree. But, belief in miracles was and is widespread. Another Christological Argument is that Jesus was a great moral leader who said he was God & he wouldn’t lie.

**Original Sin:** Most importantly, Paul originated the concept of *Original Sin.* He said Adam’s eating a fruit from the tree of knowledge disobeyed God. *Genesis* 2:16-17. Paul preached that Jesus came to Earth to die for humans and thus save them from going to Hell, a lake of fire, *Matt. 5:22, Rev. 20:10, 21:8, 15. Thess 1:8,9* because of Adam’s *Original Sin, Romans 5:12-21.* The threat of Hell that Paul preached was terrifying. He explained the crucifixion, a great disappointment to many of Jesus’ followers, in majestic terms. Paul preached to Jews and non-Jews.

**Slavery**

Seneca argued, “Every man prefers belief to the exercise of judgment.” ... “God is not to be worshiped with sacrifices and blood, for what pleasure can he have in the slaughter of the innocent.” He also said that philosophy was for the edification of the soul, “Man is a reasoning animal,” and that comets came at regular intervals and were heavenly bodies obeying the great laws of the universe. On slavery, ‘The man you call slave springs from the same seed, enjoys the same daylight, breathes like you, lives & dies like you.” His views were ignored by Jews & Christians.

Seneca explained philosophy. “Philosophy is no 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 tedious that irks us. It molds and constructs the soul; it orders our life, guides our conduct, shows us what we should do and what we should leave undone; it sits at the helm and 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.”

China: Wang Ch’ung (AD 27-c AD 97), a poor but superior man; studied by standing & reading at bookstalls. Daoism had degenerated into superstition and magic. Confucius was worshiped as a god. Fengshui began to rule men’s lives. He derided all this and gave naturalistic explanations for natural phenomena. His Discourses Weighed in the Balance was a compendium of arguments against “magical” thinking. It advocated a profound Naturalism. If the heavens had produced humans on purpose they 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 criticized Chinese superstitions, ridiculed the idea that Man had a special place in the cosmos or a life after death.

God, as Messiah, was a break from and the fulfillment of Jewish belief. Converts to the movement grew slowly, mainly in urban areas, and formed close communal communities which helped them thrive.

Jesus’ virtues of faith (the greatest virtue), hope, and charity undercut the four Roman virtues. Jesus’ message was largely (not entirely) love, mercy, compassion, charity, *Sermon on the Mount, Matt. 5-7.* As many Jews already believed in the coming of a messiah, 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 formed close communal communities which helped them thrive.

A rite of initiation into Christianity was thought to be needed. So Paul continued the Jewish practice of baptism.

The Hebrew Bible spoke only to Jews. Paul was a great missionary and an organizational genius. In his travels, he founded churches, to which he reputedly wrote letters / epistles (later put in the New Testament). Paul preached turning the other cheek / pacifism & obedience to civil rulers, even those like Nero, Caligula, and Claudius, non-Christians who were either fools or cruel. As taught by Paul, Jesus morphed from being a mere Jewish prophet into the traditional Jewish Messiah that many Jews were eagerly awaiting. Paul thus taught Jesus to be still part of Judaism.

Jesus’ message appealed particularly - but not exclusively - to the poor, who found a message of hope not found in their difficult real world, but in Heaven, where they would live in eternal comfort and happiness.

Jesus’ followers, in majestic terms. Paul preached to Jews and non-Jews.

**The Gospels**

Christianity, like many religions, began without rituals, altars, or temples, just apostles preaching. This oral tradition of early Christianity was gradually replaced by writings. Its only “scriptures” in the beginning was the Hebrew Bible. The first written stories about Jesus, the earliest known Christian writings, first appeared c40 years after his death.
in Greek, which the original 12 disciples did not speak or read. These became the Four Gospels and were attributed to Matthew, Mark, Luke, and John, and are somewhat duplicative but often inconsistent accounts of Jesus' life and sayings, the earliest of which was probably the Gospel of Mark, the last, John.

Such contradictions about Jesus' life among the gospels make those accounts of his life unreliable. Who all the disciples actually were is uncertain as a few were named differently in the 4 gospels. The Gospel of John, probably written cAD100, is the first to declare Jesus divine. It gives a more theological interpretation of Jesus. All statements in the New Testament attributed to Jesus are second or third hand hearsay. Nothing Jesus may have written exists.

Jesus' message

Paul preached that the central doctrine of Jesus' message was to atone for Adam’s Original Sin, eating a fruit from the tree of knowledge of good and evil. Because of that, all humans, not just Christians, were doomed to Hell, but could be saved from Hell through Jesus. Paul focused on sin. Saving one’s soul from Hell was the only really important thing. Unless forgiven, committing a mortal sin (serious and knowingly) condemned one to Hell forever, a very powerful threat. Confession and penance forgave sins. Jesus continued the Jewish tradition of the subjugation of women. Jesus did not speak of Mary, his mother. The New Testament barely mentions her.

Original Sin, a crucial concept

Problem of Evil

Paul addressed the Problem of Evil. He made no claim to God's fairness, "Who art thou that repliest against God? Shall the thing formed say to Him that formed him, Why hast thou made me thus? Hath not the potter power over the clay, of the same lump to make one vessel unto honour, and another unto dishonour? What if God, willing to show His wrath, and to make his power known, endured with much longsuffering the vessels of wrath fitted to destruction" Romans 9:20-22.

Many Christian sects grew with differing beliefs. The beginnings of Christianity were a struggle between Jesus' love & compassion & the additions of the men who worshiped him.

Pliny, a skeptic

Pliny the Elder's Natural History was a compendium of information about the world. It said that men "are distributed all around the Earth," and the sky is all alike for them..."Man occupies a small fraction of the earth, itself a mere dot in the universe." "Whoever God is, if he exists....is the complete embodiment of sense sight, hearing, soul, mind and of himself. To believe in...an infinite number of deities corresponding to men’s vices as well as their virtues...is an even greater depth of foolishness...God is Man helping Man, this is the way to everlasting glory." He also ridiculed the Stoics' belief that God cares about human affairs when some men don't believe in God and some act shamefully.

Tacitus, Roman historian, in Histories, “The gods are on the side of the stronger.”

In the first century AD, Romans developed the codex, individual sheets of papyrus bound together, to replace scrolls.

AD 100-300 China: Hsiung-nu nomads from Mongolia, known as Huns, exploded into China. The Han Dynasty resisted, resulting in the destruction of much of China. The 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. Buddhism reached China.

China perfected paper making using wood pulp and rags. They had watertight compartments on boats (not used in the West until c1800). They had a compass in AD 80 (but did not use it for marine navigation until the 11th century), a globe in AD 124, seismograph in AD 132, aluminum in AD 300, a center rudder cAD 350.

AD 150 Astronomy: Ptolemy / Claudius Ptolemeus, astronomer, mathematician, used Eratosthenes's lines of longitude & latitude in maps. He bought Aristotle's geocentrism, wrote Almagest, much copied from Hipparchus. It was the authoritative (but incorrect) text for astronomers & the Christian Church for c1,500 years. Ptolemy explained that planets' irregular movements were because they moved in circles. He cataloged 1,028 stars & the size & distances to the Moon & Sun. He posited that all heavenly bodies revolved on transparent perfect celestial spheres, one sphere carried the Sun, one the Moon, and 5 for the then-known planets (each with its own Roman god and internal motive power, Mars, Mercury, Jupiter, Venus, Saturn), and the 8th sphere held the stars, all revolving around the Earth. Astrology (the purported influence of the celestial bodies on earthly events) became the prevailing "science."
Lucian of Samosata (c120-c190), Greek satirist, atheist, ridiculed Christians, Cynics, Stoics, & the Olympian gods.

Christianity: *Marcion*, a leading Christian Jew in Rome, said that *Jesus* was wholly a peaceful God of love, not like the Hebrew God which was depicted as vindictive and uncompassionate. *So Marcion* proposed one gospel to be the sacred writings as authoritative for "Christians" and to disregard the Hebrew Bible. Christian Jews followed most of the Hebrew God's beliefs about God including omnipotence, omniscience, immutability, & his role as creator of all things, but with the innovation that *Jesus* fulfilled Jewish prophesies.

But the wider Christian Jewish community kept the Hebrew Bible as part of its holy scriptures. Thus the active interference of Satan which the Jews had adopted from Persian myths, became part of Christian Jews' thought. The Hebrew Bible is four times longer than the Christian Jews' writings that became the New Testament.

The concept of Satan, with supernatural powers, is inconsistent with monotheism, a contradiction in Christian dogma. Christian Jews were apolitical as they had no influence on the state.

Christianity, Mahayana Buddhism & Hinduism had 3 common important ideas, 1. The goal in life was salvation. 2. Women could share in the rites needed for salvation, 3. The Savior was man & a god, Christ, *Mithra, Vishnu, & Shiva*.

Early Christian Jews lived communally. Christian Jews taught that Man's duty to God was more important than Man's duty to the state, Stoicism. This frequently led to trouble for them. An early text on ethics, the Didache, told Christian Jews to give food & goods to the poor & to travelers. It was not put in the New Testament. Christian Jews' insistence that *Jesus* was divine and *Jesus* teaching that God was merciful caused an inexorable split with Judaism.

*Jesus'* Christian Jewish movement was becoming an institution apart from traditional Judaism, but still Jewish. The mystery religions, *Mithraism*, the religion of *Osiris*, the Phrygian Cybele, and Greek philosophy all interacted with *Jesus* sect and they influenced each other. *Plato* had written of a "soul" apart from one's body. Stoicism's concepts of universal love, the virtues of justice, compassion, and restraint also influenced early Christian writings.

*Justin Martyr* (c100-c165), a Christian Jew, a *Platonist* by training, was among the first to argue that Christian Jews should use both scriptures and Greek philosophy, and could even appropriate philosophy for its own ends. Platonists were dealing with 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. Platonism became entwined with Christianity, not without some blips.

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

*Medicine: Cladius Galen*, Greek, compiled a system of medical knowledge used until c1600. Doctors must know logic & medicine. After dissection, said a monkey was most similar to humans in viscera, bones, muscles, arteries, veins, nerves. He criticized Christians for their dependence on "faith" & said they had no empirical evidence for their claims.

AD161-80 *Marcus Aurelius* (AD 121-180), emperor & scholar, represented educated Romans relative indifference to religion. In 177 he wrote *Meditations*, mostly a mixture of Stoicism & Epicureanism. He was indifferent to the existence of the gods. "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." He advised his readers to consider how many persons had gone before them and how many will go after them. He persecuted Christians as he saw them as a threat to the Stoic teachers.

Early Christian Jewish communities organized following Jewish practices. They elected their leaders, later called bishops. *Irenaeus*, bishop in Lyon, said that the 4 gospels of Matthew, Mark, Luke, & John were inspired by God. Re the Problem of Evil, he said God made Man in his own image but not flawless. Genuine human perfection can only come through Man achieving it through his free will. Evil can exist in an imperfect world. Evil & suffering are necessary for man's spiritual growth. [This fails as many evils in no way promote spiritual growth. So Man would have to suffer evil for eons until some generation could achieve perfection]. *Irenaeus* also advanced the concept of Original Sin.

*Augustus*’s *Pax Romana*, a period of peace & stability lasted until at least cAD 180. Christians were not heard from.

*Problem of Evil*

*Sextus Empiricus* (AD160-AD 210), skeptic, doubted the validity of Induction, said suspend judgment of all beliefs, ethical pronouncements, act on habit. Said it was impossible to prove the existence of a god that does not make itself apparent. He posited a version of Epicurus’ Problem on Evil and other arguments against the existence of gods.

*New Testament compiled*

Most Christian Jewish writings were written between cAD 70-AD 200. By about AD 200, most Christian Jews had accepted a certain subset of such writings as their holy scriptures, whose reading became the basis of the various Christian Jewish sects’ worship. "Christianity" at the time was a mix of statements attributed to *Jesus*, Greek culture, Paul’s letters/epistles, and Jewish traditions. This group of Christian Jewish writings became the New Testament. The New Testament begins with the four gospels. Most features of Jesus’ birth in the gospels, as the star in the East (ref. Virgil’s account of Augustus’ birth), virgin birth, resurrection, ascension, etc, had appeared in various other myths around the Med and in the *Wisdom* stories. The pagan Greek gods were seen as demons, offspring of fallen angels and earthly mothers. Reports of miracles were common at the time and a sign of holiness.
AD 200  Marcion (ref. AD 150) likely edited Luke’s gospel & Paul’s epistles (most probably not actually or wholly written by Paul.). The Christian Jewish scriptures included various beliefs of the then popular pagan religion, Mithraism, but excluded writings of the Gnostics, Marcionists, the Gospel of Thomas & other Christian sects. Gnostics believed that salvation came not just from worshiping Jesus but in study and knowledge to free one’s self from the material world.

Jesus’ Second Coming: The New Testament stressed that Man’s salvation depended on God’s promised return, his second coming / the end of the world. There are 300+ references to Jesus’ promised return. He affirmed it. Matt 24:37, 39, 42, 44. Luke 19:15, John 14:3. His coming will be visible 1 Tim. 6:14, 2 Tim. 4:1. This belief may have caused Romans to ignore science. (A 2010 Pew poll: 58% of white Evangelicals say Jesus will likely return by 2050.)

Ask and ye shall receive.  “Whatsoever ye shall ask in prayer, believing, ye shall receive.” Matt. 21:22. “Ask, & 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 (the Jewish God) which is in heaven.” Matt. 18:19. “What things soever ye desire, when ye pray, believe that ye receive them, & ye shall have them.” Mark 11:24. “Whatsoever ye shall ask in my name, that I will do.” John 14:13. “If ye ask any thing in my name, I will do it.” John 14:14. Jesus’ promise is unqualified. Christian theologians argue that these words do not mean what they plainly say. Twain called it the Bible’s biggest lie.

Slavery was OK.


AD 200  God told women, Keep silent, obey men.

Homosexuals & effeminate men: “worthy of death,” Romans 1:31-32; 1 Cor. 6:9-10, 1 Tim. 1:10, like the OT, Lev 20:13. Women: “Wives, submit yourselves unto your own husbands...The husband is head of the wife...let the wives be under subject to their own husbands in every thing.” Ephesians 5:22-24, Col. 3:18. “Let your women keep silence in the churches; for it is not permitted unto them to speak; but they are commanded to be under obedience, as saith the law.” 1 Cor. 11:3, similarly 14:34-35, 5:33, & Colossians 3:18. “Let the woman learn in silence, with all subjection.” 1 Tim. 2:11-12, similar Titus 2:4-5. “The weaker vessel” 1 Peter 3:7; similar 2 Peter 2:8. Woman’s natural use is to have sex with men. Romans 1:27. This statement of men having sex with women in the Bible and Greek mythology, the woman’s consent is never mentioned. Unbelievers: Jesus, “Unbelievers will be “cast into the fire.” Matt. 13: 38-42, 2 Thess.1:7-10. A thought sin.


Obey kings  Rulers: The powers that be (kings, etc) are ordained of God...they that resist shall receive to themselves damnation Romans 13:1-7. “Honor the king” 1 Peter 2:17. “Render unto Caesar the things that are Caesars” Matt 22:21.

Peace: Jesus, “Think not that I come to send peace on Earth. I come not to send peace, but a sword...I am come to set a man...against his father, & the daughter against her mother...He that loveth father or mother (or son or daughter) more than me is not worthy of me.” Matt. 10:34-37. This echoes the jealous God of the Hebrew Bible.

Enemies  Enemies: “Mine enemies, which would not that I. reign over them, bring hither & slay them before me.” Matt. 19:27. Devotion: Jesus: You shall love the Lord your God with all your heart, & with all your soul, & with all your mind. This is the great & first commandment.” Matt 22:37-38. (Like one of Moses’s commandments.).

Proselytizing: Jesus, “Go nowhere among the Gentiles, enter no town of the Samaritans, but go rather to the lost sheep of the house of Israel.” Matt. 10 5-6. And, “I was sent only to the lost sheep of the house of Israel” Matt. 15:24. Golden rule: Jesus, “Whatevery ye would that men do to you, do ye even so to them.” Matt 7:12.


Mary  Mary: The gospel of Matt. 1:18-25 says that when espoused to Joseph, Mary became pregnant by the Holy Ghost. An angel convinced Joseph to keep her. Other pagan myths around the Med told stories of gods impregnating human women. (In myth, Achilles, Aeneas, Alexander the Great, Pythagoras, and Augustus were all considered to be sons of gods. Wikipedia lists over 50 demigods, children of a god or goddess and a human parent).

Parables Some sayings attributed to Jesus were parables, sometimes obscure, causing millennia of interpretations. There are numerous unresolved questions as to who actually wrote what passages, & for what purpose, & what was added or deleted, & who modified what, & how & why. Nonetheless, the Bible is Christianity & Christianity is the Bible. The
The concept of heaven, paradise

**Heaven & Hell**

writings were attributed to the disciples, who were mostly illiterate fishermen. All *New Testament* books were written in Greek. It is likely that some writers sought to blend the *New Testament* into the *Old*. Christianity was based completely on the promise of Heaven for believers & the threat of eternal torture for non-believers & sinners. The constant theme of the *Bible* is obedience to God. The Christian God commands not just how one acts, but also what one thinks. No book has had as decisive & continuing influence in the Western world, its style, its legal & ethical precepts, its realism re Man. The Greeks had showed the power of the mind; Christians looked to Man’s soul.

Like other ancient works, such as the *Icelandic Sagas*, *The Iliad*, *Syrian*, and Mayan epics, *the Bible* commanded killing foreigners *Deut 7:2*. The argument that God exists as the *Bible* so declares is called an *Argument from Authority*. It is a circular argument. The “final” collection of 27 chapters of the *New Testament* appeared cAD 367. The democratic practice of electing bishops in time became the function exclusively of the priests & other “bishops.”

**The Christian Heaven**

Christians who are saved & sins forgiven go to Heaven & become angels. Heaven is a walled city of gold & precious stones wherein God sits on a throne which has a rainbow around it. Four beasts, each with 6 eyes & 6 wings, one with the face of a man, sit around God day & night saying “Holy, Holy, Holy, Lord God Almighty, which was, is, & is to come.” 24 elders dressed in white with gold crowns also sit around God & worship him. Multitudes of angels stand around God saying “Amen, Blessing, & glory, & wisdom, & thanksgiving, & honor, & power, & might, be unto our God for ever & 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, 7:15, 21: 12-21, 22:5.

**cAD 200**

**Quintus Septimus Tertullianus / Tertullian** (c160- cAD 225) Carthage, prolific Christian author, first to describe *Trinitarianism*. Marcion & Gnostics taught that a soul is created for each baby; philosophy is the work of demons, forefathers to heretics; the Scriptures contain the wisdom of heaven. It isn’t necessary for Man to think as God has done it for them. He said fossils came from the flood of Noah. When Emperor *Severus* was persecuting Christians, Tertullian wrote an eloquent explanation defense of Christianity for the Roman magistrates, He stressed its ancient Jewish roots. He didn’t mention *Original Sin*.

Like science, philosophy has a different goal than theology. As noted on page 11, theology seeks to find facts or arguments to support a particular dogma concerning a god. In contrast, as philosophers and scientists use facts to learn more about natural phenomena. They develop beliefs, *hypothesis*: but falsifying them is as useful as verifying them. Their agenda is to advance knowledge bit by bit to make sense of phenomena. *Socrates* said, “Follow the evidence.”

**cAD 230**

**Origen** (c183-c253) a Greek Christian scholar, illustrated Russell’s special pleading aspect of theology. He said that all passages in the *Bible* had 3 meanings, the literal, the moral, and the allegorical / revealed truth, i.e., *Jesus’* virgin birth represented the birth of divine wisdom in the soul, etc. The universe was a hierarchy of spiritual beings. Origen said to interpret the genocidal passages lovingly, not literally. *Augustine* later argued similarly.

**Neoplatonism**

After *Plato*, *Plotinus* (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 *Neoplatonism*. Neoplatonists synthesized *Plato* and other Greek philosophers. *Plato* said that all reality is caused by a series of emanations from a divine source. *Plotinus* took *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. His book was *Enneads*..

This was the single most powerful merger of monotheism with philosophy. *Plotinus* made scholars look upon *Plato* and *Aristotle* as being religious. *Plato’s* philosophy fit well with the emerging Christian beliefs and gave Christianity some intellectual status.

*Plotinus’s* creation of Neoplatonism was one of the most important events in the history of both philosophy & religion. For Neoplatonists, the essence of God could not be known by intellect alone; this only produced opinion & 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*.

**cAD 250**

**Americas**

The Mayan Civilization in the Yucatan and Central America began its classical period, large scale construction, monumental inscriptions, and mathematical and artistic development, under a priesthood of mathematical diviners. It lasted until c900. Its hieroglyphics were not deciphered until the 1990s. The Aztecs built the Pyramid of the Sun near Mexico City. North and South American natives had numerous gods.

**cAD 274**

**Mani** founded Manichaeism, a Christian sect with good and evil gods. Satan caused evil in the world, so avoided the
There were numerous sects with contradictory beliefs among early Christian Jews. Docetists (Jesus' body was a phantom); Manicheists (AD 274 just above). Ebionism (Jesus was mortal & Mosaic law / law of Moses governed). Gnostics developed in Alexandria, spread widely (various sects who claimed superior knowledge. Gnostics thought it unworthy of the son of God to be born a human & to die as a criminal on a cross.). Sabellians, Jesus was one aspect of God, God was creator, Savior, & Comforter. Marcionists, the Hebrew Bible was a work of an imperfect cruel God, so ignore it; Donatists of Africa (strict moralists who didn't accept the spiritual authority of those clergy who had betrayed Christians during Emperor Diocletian's reign & regained power under Constantine); Arius (Egypt & 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, very logical. All these sects knew that they had the true Christian Jewish beliefs. The plentitude of contradictions weakened them all. To prosper, Christian Jews needed coherence in their beliefs.

Emperor Constantine (AD 272-337) promoted Christianity; He ruled from 306-337. His empire had a growing Christian presence & a pagan tradition. He catered to both. To govern more effectively, he caused them to merge. He wanted to use the bishops as a unifying force for his empire, but learned they had widely differing beliefs and interests. Sol Invictus / Unconquered Sun was then the pagan god of the Empire. Constantine outlawed magic, made Sunday, the day honoring Sol Invictus, as the holy day for Christians. He or Christian Jews' leaders also may have made Sol Invictus's birthday, just after the winter solstice, Dec. 25, also a popular pagan feast of Saturnalia, as Jesus' birthday, to attract pagan converts. Almost all of paganism's rites & festivals were subsumed into Christianity.

Dogma vs. reason: Under Constantine, Christians went from being a persecuted minority to a dominant political organization, where it could do the persecuting, albeit without a strong central leader. The bishops, with varying theologies were the power centers. The merger with paganism was not entirely smooth. The older aristocratic sophisticated pagans said that knowledge came from observation & human reason, contrary to the Christians knowledge from revelation. Thus Christianity contained what came to be called sacred & profane knowledge. The Christians used the political structure of the Roman Empire. Rome thus became more important to them, its dioceses were the administrative divisions of the empire. As Christianity became a political system, it made laws revoking many civic privileges of non-Christian Jews, kept Jews out of the military, made sexual relations between Jews & Christians a capital offense, at times banning pagan idolatry and sacrifices. From Constantine forward, Christian churches had the same interests as the kings and princes in disputes with the lower classes.

Constantine saw the squabbling sects as a divisive & destructive political problem for his rule. Fed up with the numerous squabbling bishops to whom he had given tax exemptions, Constantine, not then a Christian, nor particularly knowledgeable about it, convened, presided over, & dominated, the Council of Nicaea in order to decide & enforce a common doctrine. The attendee bishops were almost all Easterners. The bishop of Rome merely sent an observer.

The Council "resolved" the Arian dispute by voting Jesus co-equal & co-eternal with the Hebrew God the Father. Arian & non-Trinitarian beliefs were deemed not true beliefs. The Council also decreed that after ordination priests should not marry. The Council prohibited clergy from charging interest for a loan (usury) & moved the date of Easter from Passover, saying the Jews had defiled their hands with enormous sin. Easter combined the Jewish Passover with pagan celebrations of a resurrected God. This was the first ecumenical council. But actually "resolved" nothing.

The Council did produce the Nicene Creed, the basic set of beliefs of Christians. There were versions & revisions. It was finalized only at the Council of Constantinople in 381. "I believe in one God...Creator of Heaven & Earth...and in one Lord Jesus Christ...and in the Holy Ghost", plus denunciations of Arianism. Church councils in later centuries firmly confirmed the Holy Ghost as part the Trinity. All Church councils up to 700 were initiated by the Roman emperor.

Constantine rebuilt Byzantium, the Greek trading post on the Bosporus, naming it Nova Roma & moved his capital there. In 331. He issued decrees enforcing Nicaea's acts. Arius's writings were destroyed. But the Arian movement remained strong, if not dominant in the fourth century. Other sects continued. The Church said it was the only path to salvation, based on administering the sacraments. Many Church councils failed to deter diverse Christian sects growing. In the fourth century, there were 45 "councils," 13 adverse to Arianism, 15 in its favor, & 17 for the Semi-Arians.

Jesus' "religion" had no priests or altars or temples, or rites or ceremonies or "pope," i.e., one bishop ruling over all other bishops. The bishop of Rome was just that, at first elected by the Christian Jews of Rome. Rome was just one of several Christian communities, on the outskirts of the Christian world, all equal in authority over Christian Jews in their area. The bishops of the largest Christian communities, Rome, Athens, Antioch, Byzantium, and Alexandria had different dogmas (Gnosticism was strong in Alexandria.) and tended to exercise authority over bishops of smaller locales. The bishop of Rome claimed ascendancy from Peter.

The Western part of the Roman empire was ruled from Ravenna, but weakening. The Eastern part was ruled from Nova Roma. On his death in 337, Constantine willed the Roman Empire to his three sons. (Nova Roma was renamed Constantinople. It became the greatest & richest city in the West for 1000 years. But, massive corruption & quarrels
in the Church & the government weakened the empire. Germanic peoples & Goths moved into the outlying parts.

Dogmas: Hilary, Bishop of Poitiers, France, a Doctor of the Church, “It is a thing equally deplorable & dangerous that there as many creeds as opinions among men, as many doctrines as inclinations, & as many sources of blasphemy as there are faults among us, because we make creeds arbitrarily & defend them arbitrarily. Every year, nay every month, we make new creeds.” Augustine (413) estimated that there were 83 different Christian sects.

Dogma vs. reason: Julian, a general under Constantine, posed the Small God problem. Why did God, claimed to be a universal God, neglect Man for thousands of years only to preach to Jews, a small tribe when the Greeks outshone the Jews in every way. Also, “Do not the deep disputes among Christians disprove their claim to have found the truth?” This argument (Aristotle’s second basic law of thought) became Hume (and Darwin’s) Problem of Contrariety.

Dogma vs. reason: Basil, bishop of Caesarea, later named a Doctor of the Church, preached, “The bread you hide belongs to the hungry; the cloak in your chest to the naked, the gold you hide 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 that there is a good shepherd who gave his soul for his sheep.

In a smart move, Emperor Valentinian (321-375), baptized & named Ambrose, not a Christian but a popular leader, as Bishop of Milan when it was the capital of the Roman Empire. Ambrose promoted the independence of the Church from the empire. (He was later deemed a saint & a Doctor of the Church. (The concept of saint developed slowly.) Ambrose rejected scientific inquiry as it did not assist in salvation. Ambrose told Augustine the “gloss” passages in the Old Testament were allegories. In 378, Visgoths killed Valentinian’s successor emperor. The empire was fading.

Dogma vs. reason: Philastrius, bishop of Brescia compiled a list of heresies. One example, “There is a certain heresy concerning earthquakes, that they come not from God’s command, but, it is thought, from the very nature of the elements...paying no attention to God’s power. [Heresies] 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.”

Under Theodosius, The Second Ecumenical Council in Constantinople reaffirmed and strengthened public belief in Jesus’ co-equality with God and said the Holy Ghost was also fully God, even though there is little biblical support for the Trinity. The bishop/patriarch of Constantinople was given authority over Asia Minor and the Balkans.

Conspicuous consumption: 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.” The Church was associated with wealth, conservatism, and the traditional structures of society. The Church told slaves to be obedient & work hard for their masters. Titus 2:9, Eph. 6:5-7. Escaped slaves who sought refuge in monasteries were to be returned to their masters unless the masters were exceptionally cruel. Slaves could not become priests.

Gregory of Nazianzus described a war between two bishops in Cappadocia. “The pretext was souls, but in fact it was desire for control, control of taxes and contributions.” Bishop Epipnanius counted 80 Christian “heretical” sects, Augustine counted 83. Gregory of Nazianzus ended the theological debate regarding the nature of God somewhat by declaring God “unknowable” and thus speculation about his nature was futile.

Theodosius was the last emperor to rule the Eastern and Western parts. He promoted the Trinitarian doctrine. He made Christianity the empire’s official religion, outlawed all religions but Christianity. This shut out Greek thinking. The Church became a religion of insiders. It became a political as well as religious system. Bishops were given civil administrative and judicial duties. He declared Christians who did not obey the Nicene Creed were heretics and will be divinely condemned and punished by him. When he died in 395, the empire split for good. He was as important as St Paul and Constantine in making Christianity the dominant Western religion.

Women too dumb to be priests. Must hate Jews

Dogma: In 386 Archbishop of Constantinople John Chrysostom had criticized those who speculated about God as it was faith that mattered, Chrysostom opposed slavery & 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. The Church’s subjugation of women continued Jewish tradition. He was vitriolic against Jews, “lecherous, greedy, rapacious, odious assassins of Christ.” It is incumbent on all Christians to hate Jews.” Jews couldn’t hold office, serve in the army, proselytize, or marry Christians. Anti-Semites quote him still. He said that “a comprehended God is no God.” Men’s treatment of women throughout history reflected a deep fear that women were as competent as men.
A school for priests grew up in Alexandria. As the Church became more institutionalized, priests began to wear the costumes of Egyptian priests, wear mitres, tiaras, sprinkling holy water, using wine and candles and gold and silver vases, burn incense, perfumes. By the 4th century, Christianity had spread throughout the empire as a priestly religion, familiar in form to older ones. Ceremonies became more ornate. Baruch de 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.”

Jerome with others produced the Vulgate Bible in Latin from the original Hebrew, Aramaic, and Greek writings, now the official Catholic version. He urged the ladies of the bishop of Rome’s court to adopt an ascetic life, angering the bishop. He said the mountains and uneven terrain exhibited the wrath of God against sin. He was recognized as a saint although no formal canonization process existed until c1200. He and Tertullian disparaged marriage.

Visigoths, under Alaric, went south and sacked the then out of power Rome. They were paid off & withdrew. While not a decisive military victory, it was important symbolically, & was a symbol of the decline of Pax Romana that had unified much of Europe and the Med. When the barbarians migrated into the empire, there was no popular uprising against them. The empire disintegrated, the Roman army shrank. The Roman emperors then living in Ravenna were helpless.

Background: The Roman part of the Christian empire “declined & fell.” Rome, mostly pagan, corrupt, was nominally Christian. 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 of the empire, including Greece, was ruled from Constantinople, & did not decline like the Western part. Goths & Vandals, forced out of Central Asia by the Huns, spread into Europe. Rome was weakened by the pressure of the Arabs from the South and its wars with Persia and oblivious to the growing threat from the barbarians from the north.

Numerous theories have been advanced to explain Rome’s fall: lead poisoning, plague, non-Italians in places of power, incompetence/decadence of the emperors. H G Wells said that Rome declined as there was no free mental activity, no organization to develop knowledge; it respected wealth, despised science, gave government to the rich. It was colossally ignorant & unimaginative. Toynbee said it was due to a “schism in the body social,” internal divisions that undermined Rome’s unity at the core. Pagans & Edward Gibbon blamed Christianity. His 1776 book The Decline & Fall of the Roman Empire gave four other contributing causes, 1. The injuries of time & nature, 2. Barbarian attacks, 3. The use & abuse of materials, & 4. Domestic quarrels of the Romans.(see 1776 for more Gibbon reasons)

Rome’s fall is considered the dominant historical event of Europe. The fall of the Roman empire marked what Charles Freeman labels “The Closing of the Western Mind” (2003) when Greek rational thinking was stifled by the political & Christian forces of the Roman empire. Faith replaced reason. He posits that the Church became politicized & more business-like, rejecting the rationality of Aristotle (whom Aquinas centuries later resurrected). Rome’s cardinal virtues of wisdom, courage, moderation, & justice were replaced by faith, hope, & charity. The Church took over the empire culturally & politically. Christianity was largely an urban religion. Until Aquinas any form of intellectual scientific thinking in Christianity was suppressed.

In 401, he wrote Confessions, the first ever tell-all autobiography, first to use the word “I” in its modern meaning.

In 416, Rome hired Visigoths to defeat other barbarians who had taken over much of Spain. The Visigoths installed their excellent legal system, reestablished Roman control, & began a large program of church building. They became Christians. Rome lost control of its northern European lands. Other Goths advanced into Gaul / France.

413-426

Christianity defined & defended: In 413, Augustine completed the first part of De civitate Dei/The City of God, (22 volumes) the most elegant defense of Christianity of the time [perhaps of all time]. It was his answer to the pagan charge that Christianity facilitated the 410 sack of Rome. He finished it in 426. He sought to win over the cultivated pagans not satisfied with pagan polytheism. He argued to the pagans that polytheism was not conducive to mortal happiness. He said that the essential nature of Man is will, & no man wills the true God to be God unless he is touched by divine grace. “I believe so that I may understand.” Theology is faith seeking understanding.

City of God also laid out a plan of world history. It said that there are two cities in eternal conflict, the City of
Man, material, fleshy, wretched, selfish, downward turning, ("Cursed is everyone who places his hope in Man.") & the City of God, spiritual, turning upward. It is within the heart and soul of every true Christian, & 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.

413-426

Dogma vs. reason: Augustine advocated an unquestioning acceptance of faith and believed that science was a threat to true faith. [He was right] “For the Christian, it is enough to believe that the cause of all things, whether in Heaven or Earth, whether visible or invisible, is nothing other than the goodness of the Creator.”

Augustine expressed the idea, Si [...] fallor, sum ("If I am mistaken, I am.") book XI, 260), an early version of Cogito, ergo sum, which Descartes made famous 1200 years later. He made science antagonistic to religion. He made the works of the Greek philosophers profane. He made the Bible the arbiter of human knowledge, not just a guide to human behavior i.e., if science and the Bible differ, the Bible prevails.

Original Sin: Augustine expanded Paul’s concept of Original Sin. He said that logic was overruled by revelation as Original Sin diminished Man’s ability to think freely. Augustine said that all humans are sinners as they were born with Adam’s Original Sin. His exposition of Original Sin may have been a result of his using a Latin translation of Paul’s epistle to the Romans, for 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. The Eastern sects, knowing Greek, did not accept Original Sin.

Original Sin, All persons who die unbaptized deserve to burn in Hell

Eclanum

Bishop Julian of Eclanum immediately challenged Augustine, “Who is this person who sends the innocent to punishment? You answer, “God” who commands his love to us & 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.”

Pelagius

Pelagius, a Welsh cleric, also criticized Augustine’s harsh concept of Original Sin; said when men act virtuously, it is from their own moral effort and will therefore go to Heaven. Many theologians agreed. Augustine responded that sin is a state of being which Man inherits. It is so deep in Man’s nature that good deeds can’t wash it away. So Man is doomed to Hell, except through God’s merciful grace, which God may grant or withhold. So free will regarding sin and salvation is an illusion. Pelagius also answered the Problem of Evil. He said that if men choose to disobey God’s commands, God will visit evil on them. If enough people act badly. Widespread disaster will follow. This is consistent with the Old Testament. Augustine replied that men cannot choose to sin as sin is not an act but a state of being inherited at birth. Due to Original Sin, man is doomed to physical death and eternal suffering. The only way out is God’s merciful grace, which He may or may not give. Such division of men was the origin of Calvin’s pre-destination.

Augustine had Pelagius and his ideas declared heretical in 416. So, God created some men predestined to eternal torture.

Original Sin, slavery: Augustine also justified the evil of slavery as the result of Adam’s Original Sin.

[Slavery] happens only by the judgment of God, in whose eyes it is no crime.” (The first known Christian theologian to denounce slavery was St. Patrick in Ireland c450, 700 years later, He had actually been a slave.)

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. Man can escape from sin only if God decides to give him grace, given only to the “elect,” God is unknowable.

Augustine said, “Nothing is to be accepted except on the authority of Scripture. As greater is that authority than all the powers of the human mind.”

Christians must renounce earthly glory & be willing to live in small isolated places where the glory of the Heavenly City could more easily be seen. Give yourself to God & God will give you eternal peace. The goal of Christians is in another life, to love God, not of this world. All study of Nature is futile due to the impending end of the world. Thus, belief in and worship of an omniscient omnipotent and unknowable creator God became the central tenet of Christian theism.

Dogma vs. reason: Augustine argued that although Christian doctrines could not be justified by reason, 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.

Like Plato, Augustine said that Universals were the true reality. He was uncertain about 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

Dogma vs. reason: The Church defines Heresy as a teaching, an idea, directly contrary to a truth revealed by God or a truth propounded by the Church.” Believing in witchcraft (a competing supernatural belief system) was heresy. (The Hammurabi Code, Roman, and Jewish law all believed in witchcraft and outlawed it. He also said that torture was fitting for those who broke the laws of God. Heretics should be examined by beating them to death.

Christianity, now the dominant Western ideology, 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. Augustine said, “Necessity knows no law.” City of God gave first Christian justification of a “just war” that became the basis for all future discussion
Men rule women

Don’t take the Bible literally; that’s naive literalism.

Study the world, BUT... curiosity is a disease.

City of God

The City of God, 18:46, rejoiced that the Jews "were doomed to wander the world." Their plight was proof that Jesus was the Messiah. Augustine said, “All diseases of Christians are to be ascribed to demons.” Augustine said that the Earth could not be a sphere as this 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 this was challenged in the Christian universities in Oxford and Paris and by the rediscovered teachings of Aristotle. Greeks had found joy and beauty in the everyday world. Christians found it in the next life.

Augustine expected Christians to participate in civic affairs, 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. Life on Earth will always be mired in sin. City of God became the foundation document of Christian political thought, even though its view of society differed from that of the Gospels.

Adam’s sin caused all humans forever to be unable to think clearly.

The City of God’s defense of Christianity & philosophy of history dominated Western thought for c1000 years & greatly shaped Western Civilization. He was the greatest Christian scholar since St. Paul. He synthesized Greek philosophical thought & Christian belief, thus creating theological systems basic to Christianity. Christianity adopted Latin as its language. Augustine said that 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, Man needed salvation, contrary to the classical view of Man. Thus Christianity divorced itself from classical rationalism & embraced faith.

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 changed from having popularly elected bishops into having other clergy select bishops.

414

Dogma vs. reason: Augustine addressed the Omnipotence Paradoxes. The Christian God is, inter alia, omnipotent, loving, omniscient, just, most wise, merciful, patient, most high, eternal, immense, immortal, etc., i.e., the all-perfect God. These claims of all-everything, especially omnipotence, cause many logical contradictions re the concept of the Abrahamic as if God is omnipotent, can He do anything whatsoever. [including logically impossible things?]

Omnipotence Paradox

“God vs. the world” paradoxes

These are called omnipotence paradoxes, or God versus the World paradoxes. For example: Can God make a stone so heavy He could not lift it? Or, Can God make 1+1=3? Or, An omniscient God knows the future, can he then change it? If He can’t change it; he isn’t omnipotent. Or, Can God make a person greater than himself? Or, As God created Heaven, where everything is peace and harmony and no evil, will Man have free will there? Also: Can God make a square circle, a flat cube, dry water, a brave coward, a married bachelor? Such hypothetical entities cannot logically exist as their definitions contain mutually contradictory characteristics. The contradictions / paradoxes based on the claim of omnipotence are legion. If a God is omnipotent, the world is just how he wants it. The Problem of Evil is the most compelling of omnipotence paradoxes as evil and suffering affect people so greatly. The Problem of Evil pits the claims of omnipotence and benevolence against the reality of the cruel world.

Problem of Evil

Augustine’s answer to omnipotence paradoxes was to say omnipotence means God could do anything he wished.

Other paradoxes

There are other paradoxes which contrast claims for a perfect God against other claims. For example, If such God knows its own future, does it have free will? Or, Is omnipotence reconcilable with free will? That is, if such God knows everything that is going to happen, a man’s future is predestined and thus Man is without free will. (This issue has never been definitively resolved). Or, Can such God make a mistake? Or, Can such God deny his existence? (Pseudo
Augustine had several responses to the Problem of Evil. His Free Choice of the Will said God created a perfect world of everything physical and spiritual, but knew that Man, i.e., Adam, of his own free will would turn away from God, thus evil came to the world. Also, without free will, Man could not love God. Also Evil was not willed by God even though God willed Man to have freedom. [But, Isaiah 45:7 quotes God, “I form the light and create darkness. I make peace and create evil. I the Lord do all these things.”] Other variations of the Free Will Defense come later.

Also, Augustine argued that the Problem of Evil ignored the potential benefits of suffering in the world.

Also that evil was a necessary component in a larger context. Also, Evil is a deficiency or distortion in things that are themselves good but not perfectly good. Moral evil represents the absence or privation in something that is in itself good, thus an evil action as such is not evil. Also, evil is not anything positive. God is not the cause of evil but a not a thing, thus cannot have a cause. [But a sin is an evil, so if evil is not a thing, sin is not a thing, so why is there the concept of “sin”? ] Saying evil is not a thing negated human standards of good and evil.

On natural evils, diseases, floods, earthquakes, and famine etc, not caused by man, Augustine explained that such natural evils / sufferings punish Man for Adam’s Original Sin. (Plantinga 1993 used the same argument.)

Carthage Proconsul Martianus Capella compiled a curriculum of the seven liberal arts, rhetoric, grammar, argument, geometry, music, arithmetic, and astronomy, the standard reference for Western education for the next six centuries.

Hypatia (c360-415) a pagan, in Alexandria, famous scholar in math, philosophy, astronomy, head of the Platonist school. Christian monks loyal to Cyril, bishop of Alexandria, stripped her naked, stoned her to death and burned her remains. After her murder, many scholars left Alexandria. It was the end of Alexandria’s intellectual prominence.

The Third Ecumenical Council at Ephesus affirmed Mary’s divinity. As pagans became Christians, a sect devoted to the Virgin Mary developed from the idea of the pagan goddess Diana of the Ephesians.

Background, the Dark Ages, The Age of Faith: With the fall of Rome, the Dark Ages of Western Civilization began. It lasted until c1000, among the worst periods in Western history. Western Civilization collapsed, resulting in misery and suffering everywhere in the West. Over the c500 years of the Dark Ages, the sum of human knowledge in the West actually shrank. Roman legions withdrew from Britain. Vandals from Asia roamed Europe, fighting as mounted archers, with short composite bows. Rome dwindled from one million people (c25% slaves) to 50,000. Attila the Hun for a time ruled from the Rhine to Central Asia. He invaded Gaul, was defeated at Chalons & retreated. Learned men fled from the Goths and the Vandals. Some settled in Ireland establishing centers of learning.

There were few roads, no maps, no schools, libraries and books disappeared. No news, little government, no travel. Intellectual stagnation, 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, at first living alone, in time banded together and formed communities, which became monasteries. They copied Greek and Latin texts, but made no use of them. They studied only dogma. Vandals under Gaeseric sacked Rome in 455.

Knowledge of Greek ideas / texts disappeared as few spoke Greek. Greece itself was ruled from Constantinople. Local dialects were not understood 100 miles away. For most people, i.e., peasants / slaves / serfs, the Dark Ages were not much different from any other time. They continued to live in poverty, illiterate, ignorant even of the next village, in hunger, danger, superstition, and privation. The magic of the church was the center of their thinking.

Ostrogoths under Theodoric, took Ravenna deposing the last Roman emperor and conquering most of Italy. Barbarian Huns, Ostrogoths, and Vandals settled in various 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.

The early Medieval civilization that arose from the fall of the Roman empire resulted from the coalescence of:
1. the German princes who moved from Scandinavia into the West, 2. the Greco-Roman legacy, and 3. the Church.

Christianity, the only surviving remnant of the Roman empire, spread. As the only institution which preserved something of a tradition of the defunct imperial tradition, the papacy at Rome slowly achieved increasing influence, at times more powerful than any king or emperor. Greek rationality was gone.

Christianity: While Jesus had appealed to the poor, the bishops became rich from fees & taxes. There was no “popes’ yet. Whatever their rivalries, the local rulers were Christian. The Church replaced the Roman empire as the unifying element of Europe. Most importantly, it controlled salvation, the arts, education, and the language, Latin.

Dogma vs. reason: The Dark Ages in the West were ruled by Christian 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 was now the measure of a Christian. As saving one’s soul was all important, and the world would soon end, the study of science was unnecessary and futile. Dogma dominated Man’s thought in Christian West for c1,000 years. The only educated people in the West who contributed to intellectual life were clergyman. Jews were similarly
God-obsessed. Scientific inquiry was mainly Muslim for hundreds of years. Scientific inquiry in Christendom was rare.

**Pagan ideas joined the Church**

As directed by Constantine, the early Church grew by merging its dogma with the pagan myths and customs of its local subjects, including the pagan concept of a great 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 Eastern part of the empire, ruled from Constantinople, & China were less affected by the *Dark Ages*. The emperors in Constantinople, the largest & richest city in the West, ruled in splendor.

**Non-Western civilizations:** China, Turkey, Iran, & Afghanistan were then more advanced than the collapsed Roman Empire. *Aryabhata*, Hindu polymath, said τ, π, was 3.1416, a year was 365.36 days, the Earth rotated & orbited the Sun. Indians used ten “Arabic” numerals including a zero, first known usage of a zero; not used in Europe, perhaps due to Christian aversion to zero / nothing. (Babylonians had a place value system 2,000 years before, but without a zero.) Chinese had modern stirrups & were aware of how blood circulated. Empires of Ghana, Mali, & Songhai in Africa, the Maya, Aztec, and Inca in America, the Srivijaya and Majapahit in SE Asia, all rose. In all communities, violent death was common. Around 800, Aztecs made paper from wood pulp.

*c450* **Leo**, bishop of Rome from 440-461 was forceful & determined to increase the authority of the Roman bishop over other Western bishops. He convinced the *Council of Chalcedon* (451) to adopt his *Tome*, which described the two natures of Christ as one. In 452, He personally confronted *Attila* who was ravaging Northern Italy after his defeat at Chalons. When *Attila* withdrew, possibly from lack of resources, *Leo* took credit. Rome itself was gaining in power. The Latin *papa* & the Greek *pappas* (father) were used to refer to the Italian and Greek Christian communities’ bishops.

*c475* **Proclus**, head of Plato’s *Academy*, a Neoplatonist, defended Greek rationality in a Christian dominated culture.

*c497* **Clovis**, king of the Franks, adopted Christianity. *Clovis* and his sons made the Franks the most powerful of all the barbarian successors of Rome for three centuries. The emperor absent, the bishop of Rome ruled.

**Faith**

*c500* **Original Sin**: Saint *Fulgentius* c500 added unbaptized fetuses to those condemned to Hell due to their inherited sin. Apart from the basic unfairness of all future generations suffering due to Adam’s desire for knowledge, the added gross cruelty to unbaptized infants was a serious disgrace for Christian theologians.

*c520* **Benedict** of Nursia (c480-c543), repelled by the corruption in the Roman Church, became a hermit, then founded a monastery on Monte Cassino devoted to poverty, prayer, & good works. *Benedict* wrote a set of rules for communal life, *Regula Monachorum*, still widely followed. This regularized monasticism in Europe. Benedictine monasteries spread all over Europe & the monks copied & preserved Greek & Roman texts, but unfortunately did not use them for further intellectual progress. These monks also proselytized throughout the Roman empire & into pagan regions.

**Problem of Evil**

*c524* **Amicius Boethius** (c480-524), Roman, *Consolation of Philosophy*, “If there is a God, why so many evils? As far as you are able, join faith to reason,” God can be understood by Man. There are two truths, of faith & of reason. Faith prevails. He translated *Aristotle* on logic & *Euclid’s Geometry* into Latin. The Romans had not done so. He answered *Problem of Evil* by saying God wasn’t omnipotent, a spectator, rather than an intervening agent.

Emperor *Justinian* in Constantinople founded a university, & under pressure from Christians, outlawed paganism, closed *Aristotle’s Lyceum*, the Epicurean *Garden*, the Stoic *Porch*, and *Plato’s* skeptic pagan *Academy* in Athens. They had lasted c800 years and their closing marked the end of Greek higher education in the West. Greek academies, however, continued for centuries more in Constantinople.

*c529* **Justinian** promulgated the *Codex Constitutionum*, codifying the then large body of Roman law. It was in effect for 1,000 years and is the basis for modern civil law. It is the prime legacy of Rome to legal history. *Inter alia*, it stripped all rights from non-Christians, and enacted harsh penalties against Jews and pagans. Not believing in the Resurrection and Last Judgment were capital offenses. In the West, theology dominated all thought.

*c538* **Justinian** built *Sancta Sophia* (Gnostic and Greek goddess of wisdom) *Basilica* in Constantinople, consecrated in 538, the greatest building of the Byzantine empire and the West for 1,000 years. The Eastern emperors in Constantinople were closer to the Christian patriarch in Constantinople than the Roman emperors were to the bishop of Rome and were usually canonized by the patriarch’s decree. The Eastern empire, nominally Roman, was essentially Greek.

**Faith**

Dogma vs. reason: Christian dogma contributed to the decline of the Greek ideal. Superstition replaced rationality. Faith replaced virtue. Based on scripture, the Earth was deemed flat, surrounded by mountains, and was the center of the universe. Justice in Heaven, up above, replaced Justice on Earth. Obedience to the Church replaced reason.

**Natural philosophy**: *John Philoponus* (c490-570) of Alexandria, Christian philosopher / scientist, 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 (another decisive step away from Aristotle) and which led to the notion of inertia.

c550 Dogma vs. reason: Cosmas Indicopleustes’s Christian Topography drew a flat world. Greeks knew it was a sphere.

c550 Overview: By 550, the Roman empire had disintegrated. Europe has never again been one nation, ruled from a central city, speaking one language, obeying one set of laws, possessing a single culture, albeit with regional differences.

Life in the Dark Ages

During the Dark Ages, the 3 main problems for people in the West were: food, protection from murderers/thieves, and the most important, God. With the decline of secular education, all men of intellect joined monasteries that then became the only centers of learning (only dogma, not Greek rationalism). Scholars sought to use the Scriptures to explain things. Francis Fukuyama says that the Church, solely to increase its wealth, undermined the family in German lands by opposing marriage between close kin, marriage of widows of relatives, adoption, and divorce.

Natural philosophy stopped in the West

Dogma vs. reason: With the West’s most intelligent persons in monasteries (Many in far-off Ireland) they did not assume leadership roles in society that would have benefitted from their talents. Roman naturalism and rationalism (reason is the chief source of knowledge) gave way to the mysticism and transcendentalism of the Church. These changes did not occur in the other great civilizations, the Persian, the Indian, or the Chinese. All cultures had their own calendars and of course their own gods/no gods. Christianity, not Greek rationalism, dispelled the pagan gods.

Feudal system

In the wreckage of the Roman empire, feudalism, not a uniform system, emerged. Europe’s numerous mountains and rivers lent themselves to numerous independent geographic centers of power. Europe was in chaos, the most successful murderers came to control the land, so became lords, & protected their vassals, but at a high price, i.e., half a vassal’s crop or taxing for the right to run a mill. In any geographic area, only the lord/king was autonomous. Sir Walter Scott, “What can they see in the longest kingly line in Europe, save that it runs back to a successful soldier?” Thus developed the insidious doctrine of hereditary merit, nobility, denied by John Ball (1381) and others in the 17-20th centuries. The bishops and the lords supported each other, to control the peasants.

Lords frequently used Jews as their tax collectors, causing peasants to dislike Jews, but staying loyal to the lord.

c591 Gregory the Great (c540-604), a Benedictine monk, from a wealthy family, became bishop of Rome. He was most influential in transforming the bishop of Rome into being the preeminent bishop, with power over other bishops then largely autonomous, as well as kings and princes. He did so by acting like a pope, sent numerous letters to bishops simply lecturing and instructing them on Church matters, often criticizing them for simony or other actions. He sold his vast properties & used the money to build monasteries & to care for the poor. He told bishops to do the same.

Dogma vs. reason: Gregory criticized Bishop Desiderus of Vienne for teaching grammar. Gregory said all sexual desire is sinful in itself. He made his family home into a monastery He was also the civil ruler of Rome. The Constantinople patriarch/bishop declined to accept Gregory’s assertion of power over other bishops. He regarded Gregory as a barbarian. Gregory said that churches were symbols of heaven on Earth and worthy of similar grand opulence. Priests were chosen from the noble families. He gave an early definition of Purgatory, where moderate sinners waiting out their penances for sin before going to Heaven. He is now considered a pope and a saint.

c593 Gregory’s answer to the Problem of Evil, was to say it was a mystery, so man had no basis to challenge God’s actions. But did say suffering tests the faith of believers. Gregory said, “If the work of God could be comprehended by reason, it would be no longer wonderful.” He admitted the superiority of reason over faith when he said, “Faith has no merit where human reason supplies proof.” He would permit priests to marry if remaining celibate became too difficult.

Printing: China developed wood block printing as early as 593, printed a newspaper in Beijing in 700.

600 Slavery, Original Sin: St. Isidore, the Archbishop of Seville, gave an odious justification for slavery. He said that slavery was the result of Original Sin; 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.”

604 Japan adopted Buddhism as a state religion. Shinto continued to be Japan’s principal religious tradition. In the 7th century, many monasteries were founded in Europe by monks returning from Ireland, bringing books and scholarship.

610 Islam means Submission: Muhammad / The Praised One (c570-632), born Ubu’l Kassim in Mecca, orphaned, then became first a shepherd for, then servant to, then husband of, an older rich widow, Khadija (?–619). In 610, reputedly, he 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 until he died. The Koran contains ideas from the Hebrew Bible, works of Zoroastrian, and Christian and other pagan myths. There is a day of judgment, one God, a paradise afterlife for
The Abrahamic God is reputedly omnipotent, omniscient, merciful, & loving

Muhammad could have nine wives at one time, other Muslims just four (RHIP). Surah 33:49-50 of The Koran. Like Christianity and other state-supported religions, life was proclaimed a test, and how obedient to the Koran one was determined whether one goes to Jannah (Heaven) or Jahannam (Hell). Islam has no separation of church and state (unlike Christianity). Islam, as an offshoot from Judaism, was the culmination of the trend towards monotheist, eschatological, egalitarian, and universal religions. Muhammad became ruler of Jathrib.

Muhammad consumed his marriage to then 9 year old Aisha, daughter of Abu Bakr, his most faithful follower. He soon took 3 more wives, war widows. All told, he had 11 or 13 wives, a common practice then to care for widows. Muhammad owned slaves, one of whom bore him a son. After failing to convert various tribes of Jews around Medina to Islam, Muhammad simply killed the men, enslaved the women and children, and gave their land to Muslims.

Brahmagupta, Indian 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. In the West, Canon law replaced the Justinian Code.

Muhammad conquered Mecca in 630. He pronounced rules for the fair treatment among all his followers, including slaves. As he got older, he stressed the importance of warfare to spread Islam. In 632, Muhammad died and ascended into Heaven on a winged horse. On his death, Abu Bakr/Bekr became the first caliph / successor. A split developed between Shi’ites who said that only descendants of Muhammad (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 in a rivalry between Aisha and Fatima, a daughter of Muhammad. Muslims set out to conquer the world for Allah. Abu Bakr soon died in 634. Caliphs 2, 3, and 4 were assassinated.

Omar I Umar, the second caliph, a powerful but humble man, by 642, conquered the rest of Arabia, Syria, Persia, and Egypt (including Alexandria, still a center of scholarship, obtaining the Greek texts taken there after the fall of the Western Roman Empire.) Omar said, “Burn the libraries, for all their value is in the Koran.” Nonetheless, Muslims in Alexandria embraced Greek learning, becoming physicists, mathematicians, astronomers, often building on Greek texts. Islam came to dominate most of the eastern parts of the Roman Empire (except Asia-Minor).

The third caliph, Uthman/Othman (596-656), a baser and vainer man, compiled an authoritative text of the Koran / al-Qur’an (Recitations) from statements of Muhammad, purportedly inspired by talks with the archangel Gabriel. He destroyed all other versions. Such human editing lessened the Koran’s claimed divine inspiration. It has 114 surahs /chapters, arranged according to length, the longest first. The Koran’s message of mercy and charity for the downtrodden inspired many, but taught Muslims that secular culture was incompatible with moral and spiritual health. Islam was also an ideology, as it prescribed how to build 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 reform society and form a nation. Like Aristotle, Muhammad thought purpose was the driving force in natural events.

What Muslims Know

The Koran (not finalized until the 900s) speaks mainly to men. Muhammad was particularly fearful that women were men’s equal. His Koran says: 1. Men rule women. Surah 2:228 & 4:34. 2. Lash adulterers. 3. Women are chattel. 4. Muslim women may not marry non-Muslims 2:221. 5. Two women witnesses equal one man. 2:282. 6. Males inherit twice as much as females. 4:11 & 4:176. 7. Righteous women are devoutly obedient [to their husbands] 4:34. (The Koran thus teaches the most ignorant lowlife male that he is better than any female. Susan B Anthony). 8. Only believers go to Paradise. 9. God turned Sabbath-breaking Jews into apes 2:65-66, & 7:166. 10. The Earth is fixed & does not move. 27:61. 11. Jews are the greediest of all humans 2:96. 12. Allah will have non-Muslims burn in Hell (repeated over 200 times in various ways). 13. Don’t be friends with unbelievers (Jews & Christians). 3:118, 3:178 4:144, 5:51 & 5:57. 14. [Infidels] are liars all. 6:29. 15. If a man or woman steal, cut off their hands.” 5:38. 16. Gabriel took Muhammad on a winged horse to Jerusalem & to Heaven, where he spoke to Abraham, and then back to Earth. 17. Believe no one unless he follows your religion. 3:73. 20. 18. Homosexuality is condemned. 7: 80-81.
Like the Hebrew Bible, the Koran commands hating and killing non-Muslims in numerous passages (like Deuteronomy). 1. “Fighting is prescribed for you,[It] is good for you.” 2: 216; 4: 89-91; 9: 38-41, 111, 123; 47-4; 49-15. 2. For a while I will grant [Jews] their pleasure, but will soon drive them to the torment of fire.” 2:126. 3. Smite unbelievers above their necks [i.e., Cut their heads off]. 8:12 & 47. 4. Slay the pagans wherever you find them. 9:5. 5. Strive hard against the infidels. Be firm against them. 9:73. 6. Fight those who do not believe in Allah. 9:29. 7. When you meet the unbelievers in hostile array, do not retreat [...][Those who do] draws on himself the wrath of Allah, and his abode is Hell. 8:15-16. 8. Soon shall we put terror into the hearts of the Unbelievers 3:149-51. 9. Let not the Unbelievers think that our respite to them is good for themselves, We grant them respite that they may grow in iniquity; but they will have a shameful punishment. 3:178. 10. Fight the Unbelievers who [live near you]. 9:123. 11. Slay them wherever you catch them 2:191 and 4: 89 and 9: 5. 12. Fight against them until idolatry is no more. 8: 39 & 2:193. 13. Those who follow [Muhammad] are ruthless to the unbelievers. 48: 29 (& many more similar passages).

The Koran commands killing

Thus, the 3 major Western religions, Judaism, Christianity and Islam, were all relentless against other faiths. Notwithstanding such commands to hate and kill, 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 the basis of 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, & wine, with every kind of fruit, where every wish is fulfilled. Those who die in battle spreading Islam go straight to Paradise where chaste virgins await them: Surahs 38: 51 & 44: 52-6, 47:15, & 52:17+ (a useful promise for a warring nation, the virgin’s consent is not mentioned). There is no hurt, no sorrow, no fear, no shame, everyone is 33, they wear grand robes, bracelets, perfumes, recline on couches inlaid with gold & precious stones, have exquisite banquetns, served scented wine in priceless vessels by immortal youths. “In each [tent] there shall be virgins chaste & fair...Dark-eyed virgins sheltered in their tents whom neither man nor Jinn will have touched before.” “Virgins as fair as corals & rubies.” Surahs 55 and 56: “Gardens & vineyards and high bosomed virgins for companions.” 78: 31-33. “Round about them will serve boys of perpetual freshness: if thou seest them, thou wouldst think them scattered pearls.” Surahs 56:17 and 76:19. Muhammad knew what his desert nomads fervently desired, an oasis with alcohol and girls.

Shame, Honor

Dogma vs. reason: The concepts of shame and honor are most important in Islam. The Koran speaks incessantly about shame/disgrace and honor, Psychologists refer to the themes of certain religions as shame-based (Islam & Shinto) while others like Christianity are guilt-based. Shame and honor are especially important to people in the lower classes who have little going for them. Both shame and guilt / sin are powerful devices of social control and are thus useful for the ruling class. Shame arises only when others are aware of a potentially embarrassing event. Guilt is about behavior, while shame is about self. In a guilt-based culture, one can feel guilty even if no one else is aware of the sin. Honor killing of one’s raped daughter is an illustration of the power of shame (& stupidity) in Islam (“Honor”/ face is also important to many lower class males of all ethnic groups.)

The Five Pillars of Islam

The Five Pillars of Islam are: Profess one’s faith, pray 5x each day, give alms, fast in Ramadan, go to Mecca once (hajj). Muslims were / are God-obsessed like the Jews and Christians. All three religions preached an imminent Judgment Day. The ultimate objective for Muslims (like the Jews and Christians) was to seek the pleasure of God / Allah by living in accordance with the Divine guidelines as stated in the Koran. Allah is a God of might rather than a God of love. Islam is monotheistic, had no Trinity, transubstantiation, resurrection, sacraments, or reincarnation. Muhammad did not claim to be divine. Muslims practice purdah, the seclusion of women.

Islam spread quickly

Never has a religion spread so widely so quickly. By 650, Muslims had conquered all of the Mid-East and all the N. African lands on the Med (except Carthage and Tangier). Some monks blamed the defeated Christians for not being holy enough. Muslim control of the Mid-East eliminated those bishops most prone to challenge Rome for primacy in the West. The Sunnis accepted the Sunna, a body of sayings and customs of Muhammad, as of equal authority with the Koran. The split with Shi’ites endures. They kill each other. There are also smaller Muslim sects.

Technology: Chinese built a iron-chain suspension bridge c580, block-printed books 640, developed porcelain c700. Persians developed the windmill to grind grain c640. China, India, and Japan did not seek to spread their religions.

675 11th Council of Toledo (just 17 bishops) reaffirmed the doctrine of the Trinity, also decreed if a bishop seduced a nobleman’s wife, daughter or niece, he’s to be deposed.& excommunicated. Lower ranking women, no problem.

683 13th Council forbade clergy who had converted to Christianity from living with their wives, forbade clergy to sue other clergy, forbade Jews to have Christian wives, slaves, or concubines, thus freeing all Christian slaves of Jews.

677 Hui-neng: “Perfect Buddha wisdom is in everyone. To learn one’s Buddha nature, one’s mind must be free.”

c711 Muslim Empire. Muslims, having conquered N. Africa, then took much of Spain in 711, crossing the Strait of Gibraltar. Muslims also expanded into Sub-Saharan Africa, India, & South-East Asia. Muslim scholars seized on Greek learning, established libraries in Baghdad, Cairo, Cordoba (400,000 volumes), Toledo, & Basra (S.E. Iraq), which became centers of Muslim learning. The Abbasid caliphate 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 math, optics, &
718-719 Constantinople withstood a one-year Muslim siege, Islam’s first serious defeat. Persians developed windmills.

c726 The Eastern regions of Christianity spoke Greek, the West, Latin. This contributed to their separation & 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 pope and the emperors of the Holy Roman Empire (HRE) competed for power.

731 Venerable Bede, Brit. monk, made Jesus’ birth as year 1 for Christians. (Dionysius Exiguus c525 had used it.)

750 The Islamic empire became the most advanced civilization in the Western world. Greek philosophers were translated into Arabic. The wealthy families rivaling for the caliphate schemed and murdered each other. By 750, Islam ruled from Spain across Africa to the Indus River. War against infidels was a prominent feature of the Koran. Islam’s strength came in part from teaching that civil government was religious government. In addition, it was the best social and political order at the time (albeit disgraceful in its slavery and subjugation of women). Wherever Islam went, it found oppressed, apathetic, unorganized, uneducated peoples living under unsound selfish governments.

Christendom & Islam both developed doctrinally developed religions, demanding belief in their doctrines & teachings & rejecting all deviations of thought as dangerously heretical, & thus to be eliminated. Belief itself became the central religious duty. The influence of Greek thought produced a split in Islamic thought between progressives & traditionalists.

c750 Dogma vs. reason: Pope Zachary, To believe that the Earth was sphere is a heresy & deserved excommunication.

751 Arabs captured two Chinese paper makers in battle at Talas; then established paper mills in Samarkand & Baghdad

753 Donation of Constantine: Pope Stephen 3 gave Pepin the Short, son of Charles Martel, king of the Franks a document (forged & back-dated by papal official Christophorous) saying that Emperor Constantine in 320 had donated dominion over the Western part of the Empire (including Rome) to the then Bishop of Rome, Sylvester & his successors. Pepin bought it, & so then gave Stephen lands & cities he ruled in Italy, which became the Papal States, making the pope a rich feudal lord. (The Donato Constantino was only proven a forgery seven centuries later in 1440.)

c776 Mayans in the Yucatan used positional notation with a symbol for zero (before the Europeans). Sixteen Mayan mathematicians attended an astronomical congress at Copan, the center of Mayan science. Mayans used a base 20 arithmetical system. Mayans had a coastal trade using large canoes without sails. (Mayans were in decline c900).

c780 Jabir ibn Hayyan used scientific procedures for chemistry, developed processes like distillation, liquefaction, filtration.

787 The Second Nicaean Council met to restore the use of holy images; said images of Jesus, saints, and Mary, should be displayed everywhere; all visual art works must be faithful to the Bible. Sculpture was condemned as sensual.

Investiture dispute

Dogma vs. secular rulers: The struggle between Church & civil power was the center around which Medieval political theory was built. Proponents of Church supremacy cited the Bible, the Donation of Constantine, & Augustine, & argued that soul saving was inherently more important than concerns of earthly life. Modern Man can not appreciate the overpowering stranglehold that the Church held over the minds of medieval Man every waking minute. The universe of Augustine was static & unchanging. It was made to bring Man closer to God, & prepare for the next life, no other reason. Monarchs argued for the divine right of kings, also citing the Bible. Popes had the Papal States & troops. To exercise temporal power, the pope crowned (and excommunicated 8) emperors of the HRE.

Charlemagne (742-814), son of Pepin, was the most powerful man in Europe as king of the Franks & Lombards. He saw his empire as a theocracy, dedicated to guiding people’s souls to heaven. So, he told monasteries & cathedrals to build schools to instruct pupils in the proper faith, teaching Capella’s 7 liberal arts. The main source of knowledge were the texts of Isidore, archbishop of Seville, on grammar, rhetoric, medicine, mathematics, & history. The erudite atmosphere in monasteries led to the founding of universities, whose diplomats could teach in any Christian country.

799-800 Charlemagne conquered and ruled all Western Europe except Scandinavia and Southern Spain (killing around 1 million). In 799, Charlemagne restored Pope Leo 3 to the papacy after a palace coup had deposed him.

In 800, Leo 3 crowned him Emperor of the HRE, & he ruled from Aachen, to the pope’s relief. The then existing
799-800 Leo 3 split the Roman Western part of the Church from the Greek-centered Eastern part and became supreme bishop in the West, although in Constantinople, the emperor was superior to the patriarch. Charlemagne in the West also appointed bishops. Although illiterate, he sponsored a revival of the arts. In the 9th century, Irish scholars, fleeing from the Scandinavians, migrated back to the continent. Monasteries were becoming corrupt and dissolve.

After Charlemagne's death in 814, the HRE split into its German & French parts & largely disintegrated into numerous smaller kingdoms, cities, principalities, bishoprics. Popes wore robes with gold & jewels. The HRE was, as Voltaire in 1756 said, neither holy, nor Roman, nor an empire. It exercised no effective power beyond the Germanic states & Italy. (Charlemagne was canonized in 1165; but in 1765, demoted to "blessed"). The HRE was a disorderly & primitive community compared to the Muslim empire. Slowly, stirrings of commerce began to reappear. Towns grew.

c820 Islamic Golden Age: In the ninth century, Muslims began a large scale program of translating Greek texts into Arabic. Amir ibn Bahr al-Jahiz's Book of Animals described 350 kinds of animals, also said species evolved seeking food. Caliphs, especially in Spain welcomed non-Islamic scholars. This Golden Age faded c1200.

c825 Muhammad ibn Musa al-Khwarizmi (780-850) Persian mathematician, astronomer, geographer, used positional notation, the zero, and the base ten decimal point system from India. 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 & Leibniz 17th century). He wrote a Treatise on Spherical Trigonometry.

Algebra gave math a new much broader development path.

Algebra rests on certain general properties of numbers, i.e.,

Communicative law for addition: Numbers add up the same no matter which order you add them up.  
Associative law for addition: Numbers add up the same no matter how you group them.  

Communicative law for multiplication: Numbers total the same no matter how you multiply them.   

Associative law for multiplication: Numbers total the same no matter how you group them.   

Distributive law: If numbers are added and multiplied, the way they are grouped affects the total.

c846 Sea Navigation, marine astrolabe: Polaris, the North Star, is almost directly above the North Pole. As such, from the Equator, it is just barely visible over the horizon looking north. Between the Equator & the North Pole, i.e., from any given latitude in the northern Hemisphere, looking north, Polaris is thus at the same angle above the horizon. It was thus a very simple task to determine one's latitude just by measuring the angle of Polaris above one's northern horizon (its declination) using, for example, an astrolabe. For other stars, an astrolabe's star map could be turned to match the sky at any time. Then seeing that star's declination for that day in an almanac gave one's latitude.

Astrolabe Greeks first invented a crude land astrolabe around 200 BC. Muslims perfected it to help them pray toward Mecca. Muhammad ibn al-Fazari, (?-777) astronomer, is credited with building the first marine astrolabe in the 8th century. This marine astrolabe was not used in the West for several centuries.

846 Islamic Dogma: Muhammad Sahih al-Bukhari, compiled Hadith (sayings & events of Muhammad), collected 300,000 attestations, cut them down to 2,602. These are considered by most Sunni Muslims as the most trusted collection of Hadith, a few of which encourage scholarship. Like the Bible, there are many internal contradictions in the Hadith.

c850 Al-Sabi Thabit ibn Qurra (826-901) made important discoveries in algebra, geometry, and astronomy; calculated a formula to determine amicable numbers, accurately determined the length of the sidereal year, rejected Aristotle's idea of a "natural" place for objects; and proposed a theory of motion where up and down motions are set by weight.

c862 Johannes Scotus Eriugena / John the Scot / (John the Irish Born Scot) (c810-c877), Irish, translated works by Pseudo-Dionysius (reputedly a disciple of St. Paul) from Greek to Latin, the first since Augustine to bring Neoplatonism to the then European intellectual tradition, i.e., Christian dogma. It greatly influenced Medieval thought. His greatest work, The Division of Nature, (called the final achievement of ancient philosophy) divided all things into 4 categories. 1. That which creates & isn't created (God). 2. That which is created & creates (Platonic). 3. That which is created but doesn't create. 4. That which isn't created & doesn't create. 2 & 3 make up the universe. He revived the transcendentalist concept of Neoplatonism with its "graded hierarchy. "We do not know what God is...because He is infinite & therefore objectively unknowable." He said reason is needed to understand revelation. He accepted the Cosmological Argument. Sixty years later, Pope Honorius 3 ordered all copies burnt.

c865 Yakub ibn Ishaq al-Kindi (801-873) was the first of the great Muslim Aristotelians. He was the first to approach the Koran through Greek philosophy. He said that Muslims ought not be afraid to learn something from other cultures. He tried to show that speculative theology was compatible with philosophy. He preferred revelation.

c870 Ibn al-Rawandi (c827-uncertain), Muslim scholar, first a Mutazilah scholar (a school of Islam based on reason), then a Shia, then a Manichaen and/or an atheist. Al-Rawandi asserted that the Qur’an was unimpressive to non-
A Muslim Critic

Muslims. He ridiculed various Muslim practices such as walking around a large stone, said the Qur'an contained contradictions, errors, & absurdities. The Book of the Emerald is only now known for critiques of it in other books; it quoted another Muslim scholar, al-Warraq, who criticized God as an idiot for ordering his slave, man, to do impossible things & then punishing him. Al-Warraq also criticized prophets as charlatans. 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. This undercuts the notion of revealed religion. Prophets weren’t needed to teach astronomers to look at the heavens, or musicians how to make and play lutes. Prophets were simply tricksters.

879 The East: Angkor Wat, in Cambodia, a Hindu temple, still the world’s largest religious structure, began to be built (completed c1150). Chinese used printed paper money, movable type by 1041, and adopted the moldboard plow. China was the most intellectually sophisticated & technologically advanced country, invented gunpowder in the 800s.

c880 Botany: Al-Dinawari’s Book of Plants described 637 plants, described plant growth, made him the founder of botany in Islam. The major scientific advances during the Dark and Middle Ages were from Persians and Muslim Arabs.

c900 Dogma vs. reason: The obliteration of Western, i.e., Greek, knowledge in the Dark Ages was so total that the West eventually had to re-learn its philosophy, science and math from Muslim Arab translations of Greek texts. Baghdad was the intellectual center of the West. Arabs calculated the angle of the ecliptic (orbital plane of Sun’s planets) and the procession of the equinoxes. Muslim scholars also translated Indian / Sanscrit texts into Arabic.

c910 Muhammad ibn Zakriya al-Razi (c854-c925) wrote a vast 9 volume medical encyclopedia, The Large Comprehensive. He critiqued Plato & Aristotle. He was considered the greatest doctor of the Middle Ages. He also wrote a medical manual for the general public, & did chemical experiments free from alchemy. He was the first to describe smallpox & measles & distinguish between them. He wrote over 200 books on science including over 100 medical books. He has been described as “the greatest non-conformist in the whole history of Islam.”

Reason vs. dogma: Al-Razi criticized those religions that claimed to be revealed by prophets on the grounds that God should not favor some people with knowledge setting them above the masses of people as it incites hostility among men. He believed that the existence of a large variety of religions itself was evidence that they were man-made & therefore false (the Problem of Contrariety). He criticized religionists’ use of violence rather than argument when their religions were questioned. He said the supposed miracles of prophets were false as non-prophets performed the same “miracles.” He believed that common people were duped into belief. He wrote Prophets’ Fraudulent Tricks; The Stratagems of Those Who Claim to be Prophets, & On the Refutation of Revealed Religion. He said the Koran recounted ancient myths, was contradictory, and did not contain any useful information or explanation.

Abu Nasr al-Farabi (872-951) Persian, an advocate of, but then broke with, Plato and Aristotle, moving from metaphysics to methodology. He was the first Muslim to develop a non-Aristotelian logic, categorized logic into two separate groups, idea and proof, advocated a prophet-imam rather than Plato’s philosopher-king. 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. Al-Masudi, widely traveled, wrote a descriptive geography of the world.

Technology: In the 10th century, Northern Europeans developed a plow with wheels, a heavy mortarboard, and the horse collar (used before Jesus in China), on larger fields than prevailed in South Europe, caused an agricultural surplus (and a larger population) that enabled both urban & rural life and a standing army. Society was organized into the manorial system. Most parish priests bought their positions and were married. Muslims founded many colleges.

896-1049 The corrupt family of Count Theophylact controlled the papacy for 150 years, 46 popes, debauchery, incompetents, treachery, simony, teen-age popes, mistresses, nepotism, adulterous popes, child bishops, bribery, pimps, murders.

932 Spain was the jewel of Islam (& largely independent from the rest of Islam). Cairo and Cordoba both claimed to be the caliphate. Toledo was the repository of all the Greek, Mid-East, and Asian texts (& some Chinese & Indian) that Islam had collected. Christians, Muslims & Jews lived there in relative harmony. A great school of translator / scholars worked there, translating Greek texts into Arabic, & later, into Latin. By 932, Muslims had introduced irrigation & new crops to Spain & made Andalusia into a rich agricultural cornucopia. Although “written” by Muhammad, guided by Gabriel, with a purported authentic version prepared by Uthman c650, the text of the Koran was only finalized in 935.

Cordoba became the grandest (& largest except for Constantinople) city in the West, with c500,000 people, 700 mosques, 300 public baths, bookshops, postal service, paved streets, 70+ libraries. The central library had 400,000 books, more than all of France). Other Spanish Muslim cities & industries prospered. However, Castillians began to retake Spain; took Madrid in 939. The Christian recapture of Spain took c550 years, until 1492. Millennium fever: Based on Revelations 20:7-8, many Christian Europeans feared an apocalypse at 1000. So, leading up to 1000, business declined. Lawlessness was widespread. The Med became a no-man’s zone where Muslims, Moors, Egyptians, Franks, Christians, Vikings, and Greeks plundered, traded, and intermixed cultures.

c960 Abu al-Qasaim Khalaf ibn al-Abbas al-Zahrawi (936-1013) wrote medical texts used also in the West, invented
The W est Avicenna

studied

of log ic

Biruni

c1000

Astronomy: Abd al-Rahman al-Sufi / Azophi (903-986) Persian, without a telescope, saw a “Little Cloud” nebula within the Andromeda Constellation, now known to be the Andromeda Galaxy. Sufi also corrected Ptolemy’s star list.

Abu Ali al-Husain ibn Abdallah ibn Sīna / 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 with sections on astronomy (he refuted astrology), geology (said mountains were formed by upheaval of the crust of the Earth, like Xenophanes 570 BC). He built an air thermometer, Like al-Burini, he deduced that the speed of light was finite. He developed a precursor to Newton’s second law, of motion / momentum. He discussed psychosomatic illnesses. He was the first to divide human perception into the five senses of hearing, sight, smell, taste, and touch. He described melancholia.

Avicenna developed a system of logic different from Aristotle’s. He 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. He said Man had 5 internal senses, common sense, representation, imagination, estimation, and recollection. Reason has two faculties, the practical and the theoretic. Regarding the question of being, he distinguished between essence and existence which required an agent that adds existence to essence, a type of cosmological argument.

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 19th century. It introduced experimental medicine and clinical trials, as well as systematic experimentation and quantification into the study of psychology. He gave science equal status with dogma as systems for explaining the cosmos. Impeding Muslim medicine was a prohibition on dissecting human bodies.

Avicenna’s philosophy: Avicenna distinguished between essence (Mahiat) and existence (Wujud). He argued that the fact of existence could not be inferred from the essence of existing things and 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. He said that God is the eternal, unmoved First mover, who exists necessarily by his own nature and who necessarily generates the first created being, a pure intelligence, by a creative act of thought.

Although not a Christian, Avicenna showed Aristotle’s power of argument by syllogism to European Christian scholars. He thus showed Christians that there was more to scholarship than dogma, even though he saw the universe as emanating from God. Said that there are five external senses and five internal senses (common sense, representation, imagination, estimation, and recollection). Reason has two faculties, the practical and the theoretic (which may develop to the stage of actual intellect).

Background: 1000 was the arbitrary end of the Dark Ages & start of the Middle / Medieval Ages. There were no sharp demarcations between Dark Ages, Middle Ages, Renaissance, Enlightenment. These are useful oversimplifications.

Cultural change came to different locales at different times. By 1000, all of Europe, (save a small area south of the Baltic Sea and part of Spain) had come under Roman or Orthodox Christianity. Spain, under benevolent Muslim rule, flourished. The Eastern Orthodox Christians did not accept the Western’s concept of Original Sin.

The Chinese built a mechanical water wheel clock and used a spinning wheel, printed books with movable type. The European dietary staple for centuries was simply bread, of varying grains. Ten percent of Britains were slaves.

Overview: The West began to catch up with the cultures of the Far East and the Muslims. There’s no agreed upon theory for this. The center of wealth, power, and culture began to shift from Italy to N. Europe. Virtually all the men who contributed to intellectual life were churchmen (Dante an exception), Merchant guilds organized in Europe.

Islam swept across India starting in the 11th century. It was brutal against the atheistic Buddhist monasteries. The two major occurrences that decisively affected the balance of the known world during 1000-1500 were the outpouring of Turkish, Mongolian, and Tungusic peoples from the Eurasian steppes, reaching a climax under Temujin / Genghis Khan in the 13th century, and beginning c1300, the rise of a vigorous civilization in Western Europe.


Abu Rayhan Muhammad ibn Ahmad Biruni (973-1048) Persian, first Muslim scholar to study India, like al-Haytham, he developed a scientific method, which he introduced into mechanics, was the first to conduct experiments related to astronomical phenomena. He wrote 146 books, including 35 on astronomy, 9 on geography, 23 on astrology (a false “science”). He observed & described a solar eclipse. With al-Khazini, he combined hydrostatics with dynamics to found hydrodynamics. He said astronomical data work as well if the Earth rotated & orbited the Sun as the earth-centered
Ptolemaic model. He amazingly said that the Earth’s diameter was just 1/4 of 1% less than current knowledge.

Gravity? Biruni said there was an attraction of all things to the center of the Earth & that an object’s weight equaled the weight of the fluid it displaced (Archimedes had said it c220 BC). He measured the weight of cold & hot water, of salt & fresh water. He speculated that the Milky Way was a collection of numerous nebulous stars. 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.

Speed of light is finite Biruni & al-Haytham deduced that the speed of light was finite. Biruni said that the speed of light was faster than the speed of sound (Aristotle had said this was true because seeing was nobler than hearing). Along with al-Kindi and Avicenna, he was one of the first chemists to reject the alchemists’ theory of the transmutation of metals.

Heresy Christianity: Differing Christian movements proliferated in Italy, the Rhineland, Flanders, and France, all more or less associated with Manichaicism. 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) was the most powerful/widespread of these “heresies.”

China: The bureaucratic reorganization of the first Sung rulers took full effect. China’s social and economic structure achieved a new and lasting balance between the feudal (officials, landords, 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 (with massive irrigation projects), industry, and trade in the world.

China mined & smelled as much iron as all of Europe would make in 1700. The state encouraged education. Chinese ocean trade (with cotton sails, the compass (adapted for navigation in the 14th century), the astrolabe, an adjustable centerboard/keel, & far larger vessels than the West) flourished & displaced Muslim traders in the Indian Ocean and farther East. The Chinese perfected gunpowder & used it as a flying flaming projectile c904, and used movable type.

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, do they have different truths?” This question is irrelevant now, but big then. Charles Van Doren described 7 themes & advocates that dominated this theological 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. (524).
3. Avicenna showed Christians there was more to scholarship than religious dogma. (1010 )
4. Abelard applied logic to the scriptures. (1121)
5. Bernard criticized Abelard for presuming to understand God by reason. (1140)
6. Averroës said there’s one universal truth that can be comprehended through the Koran or by reason. (1150).
7. Aquinas wanted to base religion on more than just faith. (1269.)

Dogma vs. reason: The obsession with dogma in the Dark and Middle Ages reached extreme standards, i.e., the argument over “Universals.” Aquinas & Abelard were pioneers of the Scholastic school of philosophy, the attempt to explain & define Christian doctrine using Aristotelian logic/reason, to put together a coherent system of traditional thought, or applying logic to dogma. Like Plato, scholastics said concepts like “good” or “true” were reality, realism.

Ibn Yunus (950?-1009), Egyptian mathematician and astronomer made astronomical observations with an astrolabe 1.4 meters large, so precise that 19th century astronomers relied on them.

Physics / Optics: The most brilliant of the Muslim scholars in Toledo was ibn al-Haytham / al-Hazen (965-1039) who recognized that each point of an object reflects light into the eye. Pythagoras and Aristotle had thought vision was something emanating from the eye. Al-Haytham said that was absurd. He wrote The Treasury of Optics, 7 volumes (1011-1021), the definitive work on optics.

He explained how lenses worked, described the structure of the eye. He studied and wrote about mirrors, made parabolic mirrors (600+ years later used in reflecting telescopes), said that light entering a denser medium, bent toward the perpendicular as it slows down, invented the camera obscura, said the speed of light was finite (contrary to Aristotle) & discovered Fermat’s principle of least time. Light travels between two points over the shortest time path.

His scientific method was 1. Observe, 2. State problem, 3. Form hypothesis, 4. Analyze experimental results, 5. Interpret data and form conclusion, 6. Publish the findings. “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. Thus 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.”

Haytham erred on rainbows, as he accepted Aristotle’s explanation. Al-Haytham laid the foundation for all future
work on optics, including the microscope, not invented until c1595. **Al-Haytham** developed rigorous experimental methods of controlled scientific testing to verify theoretical hypotheses and substantiate inductive conjectures. He discussed the theory of attraction between masses (later called gravity), and was aware of the magnitude of acceleration due to gravity and discovered that the heavenly bodies were accountable to the laws of physics. He said that a body moves perpetually unless a force acts on it. (In 1687 Newton made it his First Law of Motion.)

**c1040** Math: **Al-Jayyani** (989-1079) Cordoba, first treatise on spherical trigonometry (polygons and triangles on spheres).

**1046** Politics: King **Henry 3** of France deposed two pope pretenders & installed **Clement 2** as pope. **Clement 2** that day crowned **Henry** emperor of the HRE. Under **Henry 3**, the **Medieval HRE** peaked, from Hamburg to Sicily to Hungary.

**1054** **Great Schism** Christianity: An emissary of Pope **Leo 9** excommunicated Patriarch **Michel 1** of Constantinople, who then excommunicated the emissary. This finalized the linguistic (Latin vs. Greek), political, doctrinal, theological, & geographic split in Christianity, the **Great Schism**. The Roman & Eastern Orthodox Christian churches have identical claims to Jesus.

**1066** The biggest business in the West The Church became the biggest business in the West, collecting money for preforming sacraments, weddings, from offerings, selling indulgences, rents of Papal lands, simony (sale of church offices, like bishoprics and cardinalships). Selling a bishopric was lucrative for a king or the Church, and a good investment for the “bishop” who bought it & in turn sold parishes to priests. Simony was of course a sin. Bishops and cardinals were often princes with huge estates. Usually, only the clergy could read, kings couldn’t. Belief in miracles, witchcraft, and relics was universal.

**1059** Peter Damian, an emissary of the pope, found that every cleric of every rank in Milan had practiced simony. **Damian** declared all worldly natural philosophies [sciences] “absurdities” and “fooleries.” 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. **Aquinas** c1280 repudiated this. It is forgotten now.

**c1060** **al-Zarqali** Abu Ishaq Ibrahim ibn Yahya al-Naqqash al-Zarqali (1029-1087), in Toledo, instrument maker and the leading theoretical and practical astronomer of his time, wrote two works on an instrument to compute planets’ positions, perfected a type of land astrolabe, corrected Ptolemy’s geographical data, specifically the length of the Med.

**c1060-95** China: **Shen Kua** (1031-95) wrote advanced treatises on agriculture, archeology, cartography, ethnology, geology, math, medicine metallurgy, meteorology, music, painting, zoology, climate change, and the classics.


**1066** **Omar Khayyam** (1083-1123) author of The Rubaiyat, deduced how to solve cubic equations, power higher than 2.

**1073-77** Church can’t err. **New Pope Gregory 7** wanted a “religious society,” administered by a secular arm and a religious arm, who were to cooperate. **Gregory** required priests to be celibate to prevent them from passing church lands to their sons. His Dictatus (1076) stated that the Church never erred and never would until the end of time, and popes can’t be judged by humans. He told **Henry 4**, the French HR Emperor, that he could not appoint/invest bishops.

**1076** Law: “Going to the law” meant having a priest pray for advice, trial by fire, or trial by drowning, or going to an astrologer. The Roman laws of **Justinian** had been lost since 603. In 1076, a Digest of Justinian’s Laws was found in a library in Ravenna. This put all Roman law in the hands of all the people, who could then approach the law in a rational way, a tremendous step forward. Bologna, relatively independent from both the pope and the emperor, became a center of the teaching of law. The University of Bologna was founded in 1088, specializing in law.

**1076** Anselm, Ontological Argument Dogma: **Anselm** (1033-1109), Italian, Archbishop of Canterbury, Benedictine monk, father of scholasticism (the attempt to apply Aristotle’s logic to Christian dogma), devised an Ontological Argument for God. [Ontological arguments derive from sources outside observing the world, i.e., from reason alone]. **Anselm** started with the idea of a perfect being: “Lord, thou art a being than 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, the Christian position today. He was later canonized. Said (like Augustine), “I must believe in order that I may understand,” (Abelard 1121 said the opposite.) Kant later named the argument “ontological.” (Gr. Ontos = being).

Guanilo refused Anselm

The monk Guanilo of Marmoutier, a contemporary of Anselm’s, quickly pointed out the error of the syllogism. 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 replied that the theory only works for God. One can conceive of a perfect island that does not exist but not a perfect being. Another flaw in Anselm’s logic was that he put existence into the definition of the most perfect conceivable being. To then say “God exists” restates the definition. The argument was forgotten until Descartes, de Spinoza, and Leibniz revived variations of it. Aquinas (1273) rejected it as illogical to jump from idea to reality. Kant killed the argument completely (1781), called it a “miserable tautology.” Schopenhauer c1820 dismissed it as a “charming joke.” On Original Sin, Anselm said anyone who dies unbaptized, including babies, will go to Hell.

1085 Science: 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, who flocked to Toledo, including Adelard of Bath. He translated Arabic works on meteorology, optics, acoustics, botany, and Euclid’s Geometry from Arabic to Latin & thus brought them to Europe. This huge body of knowledge began the revival of learning in the West, applying logic, Aristotle, to Christian dogma, scholasticism. Adelard’s exposition of the rational & secular investigative approach he found in the Arab texts most influenced European scholars. He wrote about the astrolabe. Then more Christian & Jewish translators in Toledo & Seville put Arabic texts into Latin. Arabs thus gave numerous scientific works to Europe.

al-Ghazali stifled science in Islam

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 & al-Haytham’s Optics, or as Arabic translations of, & learned critiques of, Aristotle’s works. However, Muslim theologians, quoting al-Ghazali (1058-1111), the most influential theologian of Islam in the Middle Ages, stifled Muslim efforts at free inquiry & limited scholarship to studying the Koran & Hadith. His most important book was The Revivification of the Sciences of Religion. It is a blend of dialectic, mysticism, & pragmatism. It has largely shaped Islam as practiced today. It declared that one must renounce all illusions & open oneself to Allah.

Dogma vs. reason: Al-Ghazali was the earliest philosopher to deny the necessary connection between cause and effect. He intended to prove that miracles are possible (miracles presuppose a god) and God can intervene in the natural setting of causes and effects. He urged ignoring all secular learning, even math. In the West, Latin remained the language of all scholars, most of whom were clergy.

Al-Ghazali distrusted human reason. He wrote The Incoherence of the Philosophers, which condemned Muslim philosophers, particularly Avicenna, for advocating doctrines incompatible with their faith. Al-Ghazali also posited a Cosmological Argument for God/Allah, based on the impossibility of an infinite regress of causes. Said, “Man’s nature is made up of four elements, which produce four attributes, the beastly, the brutal, the satanic, & the divine. In man there is something of the pig, the dog, the devil, & the saint.” Arab scholars considered Europeans crude.

Modern Science

Muslim scientists laid the foundations of modern science with their introduction of a Scientific Method and a modern empirical, experimental, & quantitative approach to inquiry. The Golden Age of Muslim science ended due to al-Ghazali and the establishment of the theological seminary Nizamiyah in Baghdad. Science in Islam has never recovered.

1090 Technology: Although basic science stagnated during the Dark & Middle Ages in the Christian West, technology advanced. By 1090, 5,000 watermills were in use in England. As towns developed, piracy evolved into trade. Europe had no paper, necessary for scholarship. Muslims had paper and papyrus. Parchment was expensive and scarce.

c1095+ Selling Indulgences: Purgatory is where moderate sinners who died were “purified” for varying periods to qualify to enter Heaven. The Old Testament described praying for the dead (to reduce their time in Purgatory). Venal sins were assigned varying periods time in Purgatory. A moderate sinner could easily incur a debt of 300 years in Purgatory. German pagans had a custom of paying money to commute the penalty for a crime. The Church adapted this custom into selling indulgences (which forgave various sins at different prices depending on the sin, to reduce one’s time in Purgatory). One year of Purgatory cost 26 solidi of silver, or, if one couldn’t pay, 3,000 lashes. Bishops could grant indulgences, normally done for money. The selling of indulgences evidencing the corruption of the Church was very profitable for bishops but the pope took over the business. Centuries later, the blatant selling of indulgences was the last straw for Martin Luther. Robert Ingersoll, “The Church has always been willing to swap off treasures in heaven for cash down.”

1096 First Crusade: Urban 2 called for a holy war army to defeat the Muslims who had captured the Holy Sepulchre in Jerusalem. He promised absolution for all their sins for those who would go to fight the Muslims. It promoted a salvation fervor throughout Europe. Sinners without money by the thousands joined to kill Muslims. Christian mobs slaughtered thousands of Jews & stole their wealth on the way to Palestine. (7 crusades 1096-1270 + the Cathars) Urban also decreed that those who died in such battle would be martyrs & go to Heaven, like the Koran’s promise to its martyrs. In 1099, Crusaders captured Jerusalem, torturing & slaughtering 30,000 to 40,000 Jews and Muslims, men,
women and children. *Urban 2’s Pax Ecclesiae/Peace of the Church* banned fighting near churches, harming clerics, pilgrims, women, or peasants. Due somewhat to bequests, bishops became great landowners, feudal lords.

1121 **Abelard:** William de Champeaux, in debate, forcing Champeaux to modify his views, resulting in the eventual triumph of *Nominalism over Realism*, until then dominant. (*Nominalism,* abstract terms, universals, represent no objective real existence but were mere words, *names.* *Realism,* Universals like concepts, colors, etc., were real things, opposite of current meaning.) His great idea, God considers the intention of the action, not the action, that counts as sin or not.

1122 Abelard wrote *Sic et Non / Yes and No,* a collection of 188 apparently contradictory quotations from Church officials on many aspects of Christian dogma, using dialectic for reconciling the contradictions. The Church declared it and him heretical. He claimed that his reasoning was simply finding the truth to benefit the Church. He was the most popular teacher of his day. Paris was the dominant school in N. Europe and center of Christian dogma and dialectic.

*Abelard* said, “I must understand in order that I may believe.” (The converse of Augustine and Anselm). He said, “Doubting leads to questioning; questioning leads to truth.” 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 love travails, he founded a convent at Paraclete, where he installed Heloise. She later became abbess. Their reputed love letters were later published.

**Abelard’s** Rules for Argument

1. Use systematic 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 other.
4. Watch for error, even in Holy Scripture.

1123 *First Lateran Council.* Rome: Priests can’t marry, cohabit, sell ecclesiastical benefits. Clerical marriages were invalid.

c1130 **Hugh of Saint Victor** (an abbey in Paris) proposed that secular learning of the natural world was a necessary grounding for religious contemplation. “Learn everything, later you will see that nothing is superfluous.”

1139 **2nd Lateran Council:** Innocent 2 called the 2nd Lateran 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 1st Council’s canons, told the clergy to dress modestly, prohibited jousts and use of the bow and arrow or crossbow against Christians, condemned usury. Priests couldn’t marry, co-habit, or study Roman law. Celibacy was required to prevent bishops from leaving their sons their property & wealth. (Before 1000, 11 popes were sons of popes or priests. After 1139, only 6 popes were known to have children, all in the 1400s &1500s). Eastern Orthodox priests could marry.

1140 **Law:** Gratian. Bolognese jurist, wrote a lawyer’s textbook, *Decretum,* *A Concordance of Discordant Canons,* unified the then various Canon law decisions by various bishops. It reorganized and rationalized ecclesiastical law. He made canon law much more subject to reason. 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.

As we have seen, belief in the supernatural was, in the West, (more or less, until the Enlightenment in the 18th century) a cultural universal. Dogma, i.e., beliefs in a particular supernatural entity that has control over natural events, however, is/was not a cultural universal. It is a subset of supernaturalism that developed to present Christian supernatural beliefs as truth as opposed to the pagan supernatural beliefs of the Greeks and Romans.

c1140 **Dogma vs. reason:** Bernard (1090-1153), founder of & 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 paths. Said that knowledge was only justified when it promoted purification of the soul. Like Hugo’s Javert, Bernard pursued Abelard relentlessly, convinced the pope to confine Abelard in a monastery.

1146 **Pope Eugene 3** called the 2nd Crusade. It began with Christians massacring Jews in the Rhineland. Bernad said, “A Christian glory in the death of a Moslem because Christ is glorified.” It was a total failure. The Crusades brought new ideas into Europe, simply from contact with a different culture (such as windmills from Persia). The Crusades were the first examples of overseas imperialism, gave Christianity a militant tone. (*Onward Christian Soldiers*)

c1147 **Medicine:** Abu Merwan Abdal-Malik ibn Zuhr (1091-1161), called the father of experimental surgery, introduced methods of dissection, invented the tracheotomy, gave the first accurate descriptions on neurological disorders, wrote an early pharmacopoeia, discovered the causes of scabies & inflammation & with al-Zahrawi, invented anesthesiology.

1147+ **Christianity, 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, & equality of the sexes. A dualistic system; things of the spirit were created by God & were good. Evil things were created by Satan. Man’s soul, a good, was trapped in Man’s evil body. The organized Church was evil. The Cathars were the first mass heretical movement after 1000 to seriously threaten the bureaucracy of the Church, simply by denying the
Averroës

His ideas exerted an important influence on Christian Medieval thinking. He called for a return to Aristotle's attitude towards nature, i.e., study it. He developed the teachings of Aristotle on lines that made a sharp distinction between religious and scientific truth, and so prepared the way for the liberation of scientific research from the theological dogmatism that restrained it under both Christianity and Islam. He said that philosophy and the Koran implied the world and that God had always existed. He said the soul was mortal. Averroës also advanced a Cosmological Argument for God, "God is the eternal, unmoved First Mover, who exists necessarily by his own nature and who eternally generated the first created being. The First Intelligence created the second intelligence and also the first celestial sphere... to the Tenth Intelligence."

Averroës & Avicenna achieved a momentous unification of religion & philosophy by envisioning the universe as a series of emanations from Allah, from the first intelligence to the intelligence of humans. So they could claim that there was only one truth, that appeared like two truths, religion for the uneducated masses & philosophy for the educated elite, & the study of science was necessary to understand religion. They wanted to infuse Islam with natural philosophy, i.e. reason, but failed, as Islam was as God-obsessed as Christianity, & not receptive to speculation regarding spiritual matters.

Averroës was far more influential in Jewish and Christian thought than in Islamic as his doctrines were condemned by Muslim clergy, citing al-Ghazali (ref. 1085 who had written The Incoherence of the Philosophers. In response Averroës wrote The Incoherence of the Incoherence). Said, The being of existent things is inseparable from their essence. A year before his death, a Muslim mob burned Averroës’s books. He fled Spain. Many of Averroës’s students fled to Padua to continue teaching his philosophy of empirical investigation of a rational world. Padua was under the protection of Venice, anti-pope, anti-clerical and an equal of Constantinople or Paris. Franciscans (later) generally favored Averroës’s ideas; Dominicans (with Aquinas 1273) attacked him.

Averroës was the last and greatest of Arab Aristotelians. He said that there was one eternal truth which could be comprehended through the Koran or by natural knowledge, with the aid of Aristotle and other philosophers. He rejected the theological control of philosophy. “Knowledge is the conformity of the object and the intellect.” He wanted Islam to consider women equal to men. Maimonides taught Averroism.

Dogma vs. reason: There have been no significant scientific advances from Islam for almost 800 years. Muslims have translated virtually no scientific texts into Arabic for 1000 years. Science under Islam is mired in creationism, denying even evolution. The 7th century mentality and knowledge in the Koran stifled science in Muslim lands. This has caused Islamic countries to lag behind other Western countries, a cause for shame, important in Islamic dogma.

Technology: How to make paper reached Europe only c1150 through Muslim Spain. Korea and China used moveable type in printing. China used printed money, explosive grenades, and 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; hand copying was expensive, albeit done by monks or slaves. Knowledge was thus largely memorized, not efficient.

Daily life: After 1000, numerous cathedrals were built in France (costing 25% of GNP), the greatest civil works since St. Sophia & no comparable projects were built until the 19th century. The skilled men who knew how to build them called themselves freemasons, were the elite of workmen. Wandering troubadours sang of chivalry & courtly love. As the horse transformed warfare, the landowner was the most powerful warrior. Murder was common, merchants were the first to want rational factual information. A new class of urban merchants contributed to the new prosperity. Water mills & 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. Monasteries & convents proliferated. The Black Mali empire had large slave plantations as cruel as later in the U S.

Scholasticism began early in the 12th century with Anselm. Scholastics wanted to offer scientific / rational proofs for theological issues, such as God’s existence (Aquinas 1269+). Its 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” & in syllogistic reasoning. 4. It was discovered that Aristotle and Plato did not agree on the question of universals. The downside to dialectical 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. The
astrolabe, adapted for ocean travel, and the magnetic compass were used in navigation. (Later star-angle measuring instruments were made by Hooke 1666, Halley 1692, and Thomas Godfrey and John Hadley in 1731 (an octant)).

Communications: 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 who could read. (Greek had been largely forgotten in the West). The Vatican decreed that missing Mass was a mortal sin, the torture of Hell unless forgiven.

The Mass was a show of magic, the priests dressed in splendor, in an ornate setting, with incense, holy water, speaking Latin to God, which peasants did not understand, magically changing a wafer & wine into the flesh & blood of Jesus, transubstantiation, describing eternal torture in Hell for non-obedience and instructing the people how to be saved from Hell. The people were 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. The Church dominated people’s minds every waking moment. Most people lived in constant intense fear of sin and Hell. Belief in witchcraft was widespread even though believing in any supernatural beliefs other than Christianity (such as witchcraft) was a sin.

1154 Maps: Abu Allah Muhammad al-Idrisi (1099-1165) drew the most accurate map of the world then known in the West


1179 Third Lateran Council: decreed only cardinals could elect the pope, condemned usury, sodomy by priests, plundering, and tournaments. Clergy can’t have women in their houses, can’t charge money to perform burials or marriages. Jews can’t have Christian servants. Evidence of Christians was always to be accepted against Jews in court.

1182 King Philip 2 expelled Jews from France & took their property. Paris became the intellectual/artistic capital of Europe.

1184 Before the 13th century, the prosecution of heretics was divided between the bishop and civil authorities. The bishop accused, 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 violence, torture, burning at the stake, and/or imprisonment. Inquisitions were immensely profitable for the Church; they confiscated all a convicted heretic’s property. Even dead people could be dug up, tried, convicted, & had their property taken from their heirs.

Cathars in Southern France (1147) worshiped Jesus but without the participation of the Vatican & were thus declared heretics. The various inquisitions also punished witchcraft, sometimes more cruelly than heresy. These inquisitions were not effective, as bishops often lived in Rome & didn’t visit their dioceses often and 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/Roman Inquisition (1233+), the Spanish Inquisition (1478-1834), and the Portuguese Inquisition (1542-1860). In 1187 Sultan Saladin / Salah al-Din recaptured Jerusalem.

c1190 Dogma: Moses Maimonides / Moshe ben Maimon (1135-1204), Spanish rabbi, a contemporary of Averroës in Cordoba, then forced out of Cordoba by Muslims, lived in Cairo. Greatest figure in Jewish history since Moses. Codifier, judge, & commentator on the Bible & Talmud. His Moreh Nebuchim / Guide for the Perplexed, sought to show that the teachings of Judaism were in harmony with Aristotelian / logical / basic laws of thought and offered insights that reason alone could not obtain. The Perplexed were those who had studied Jewish law & those who had learned what philosophers / scientists had said about the Hebrew Bible’s anthropomorphic (vain, vicious, etc.) God.

He tried to explain The Hebrew Bible’s contradictions and obscure parts. His Guide was essentially midway between prophesy & rationalism. His Guide cited Plato to a lesser extent. He said “Thou shalt not kill” & “Love thy neighbor as thyself ” were admonitions that applied only to fellow Jews. Said don’t take the Pentateuch literally. He believed that the nature of God was unknowable. He ridiculed astrology. He saw the mass of religious people as ignorant. Though Orthodox, he offered brilliant beginnings to secular Judaism.

He liked both Aristotle’s idea of an eternal universe and the Hebrew Bible’s idea of God creating the universe. He said that Man could only know that God exists, but could say no other positive things about God, just attributes of things that he was not. He taught that the idea of a God about one could say positive things is simply wrong. His writings spread throughout Spain and Southern France and inspired a burst of Jewish philosophy for centuries.

The great Jewish mysticism, Cabala, grew out of Maimonides. It was a melding of his idea of the total unknowability of God with Gnosticism, Neoplatonism, some ancient Eastern mythology, & Hasidism (means the devout). Orthodox Jews said Maimonides had abandoned Judaism, deprived God of his attributes, denied the possibility of creation.

1198-1199 New Pope Innocent 3 regained control of the Papal States in central Italy. He nominated HRE emperors, and sent Domingo / Dominic de Guzman, a Spanish priest, to convert the Cathars. Dominic concluded that only priests who displayed genuine humility and zeal could convert the Cathars.
Background: Mongols, a new wave of tough horsemen burst out of Mongolia to create the largest empire the world has seen. Genghis Khan conquered Northern China and west to the Caucasuses. Genghis was the most religiously tolerant leader in the world. By 1231, the Mongols/Huns were stopped only at Vienna. Kublai Khan, a grandson of Genghis, and Timur u-lang / Tamerlane (Tammar the Lame) expanded the Mongol empire, but it withered after they died.

Dogma vs. reason: By 1200, monasteries had again become prosperous and corrupt. Two consciously rival intellectual schools arose as Aristotle infused into Western thought. One, led by Dominicans, Aquinas, Albertus Magnus, Fibonacci, Grosseteste, & Roger Bacon Christianized Aristotle by asserting the superiority of revealed truth over any mere human reasoning - thus preserving central Christian doctrines which could not be rationally proven, but also trusted in reason insofar as it did not contradict Christian truth. The other tradition, Franciscan, stuck more closely to Augustinian & Platonic intellectual beliefs. Fear of magic/witchcraft continued.

National epics were written in the local languages, Beowulf, England 900. Edda, Scandinavia 1100. Cantar del Cid, Spain 1140. Perceval, France 1175. Niblengun, Germany 1205. Chanson de Roland, France c1200 (a brave general of Charlemagne is killed by Saracens). Parzival, Germany 1210. (based on the French Perceval.)

Theory of History: Joachim of Fiore (c1136-1202), Italian mystic, posited three eras of history, Age of the Father, pre-Jesus, where Man obeyed God. Age of the Son, 30-1260, when Man became the son of God. Age of the Holy Spirit, 1260+, when Man would be in direct contact with God, reaching the total freedom that Christ preached. He said that no clergy were needed. In 1263, Pope Alexander 4 condemned his ideas.

Mathematics: Leonardo Fibonacci / Leonardo da Pisa brought algebra to Europe with his, Liber Abaci / the Book of the Abacus. It introduced the use of Indian-Arabic numerals, including the zero, to Christian Europe. His 1220 book, Practica Geometriae, applied Indian-Arabic numerals to geometry and to trigonometry (the math of triangles).

Pope Innocent 3 ordered the fourth Crusade, said, “The Jews are doomed to wander the earth as fugitives and vagabonds, and their faces are covered with shame.”

The pope’s Final Solution for the Cathars: Innocent 3 sent Pierre de Castelnau to South France to convert the Cathars (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 Albigenian Crusade against the Cathars. He said all property of convicted heretics could be confiscated.

“Kill them all” Nobles from North France hurried south to join the killing and to grab some land. Innocent 3 called the Cathars, inter alia, cannibals. Arnauld, Innocent’s Cistercian abbot commander, led a brutal massacre against the town of Beziers. Arnauld reputedly said, “Kill them all, for the Lord knows those that are His own.”

Afterward, Arnauld wrote to Innocent & portrayed the murders as part of a divinely designed event. He wrote, “Our men spared no-one, irrespective of rank, sex, or age, & put to the sword almost 20,000 people.” This great slaughter wiped out the whole town. “Divine vengeance raged miraculously.” In three decades, the Cathars were wiped out.

Christianity: Francis of Assisi (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 & penitence.” His simple dignity was a rebuke to the princely style of the Church hierarchy & captured for the Church an outpouring of religious enthusiasm. In 1210, Innocent 3 reluctantly recognized his order. After Francis’ death in 1226 the order was racked by dissension for over 100 years, some favoring owning property & some not, eventually splitting into several orders. Francis was canonized in 1228.

The intellectual power of Aristotle’s ideas dominated scholarship and so posed a problem for the Church, as empirical observation was contrary to Augustine. A synod of bishops in Paris, with the pope’s support, banned teaching Aristotle’s works, under penalty of excommunication. Aristotle’s influence was so great that he was known simply as the philosopher. The concept of reason expanded from Scholastics’ pure logic to include observation & experiment.

A crusade reputedly inspired and led by a young boy gathered thousands of children from German lands, expecting the Med to part so they could march to Jerusalem. It did not. Two merchants offered passage on their ships. The children disappeared. In 1230, a priest explained that most children drowned or were sold as slaves in North Africa.

All the nine crusades against Muslims over two centuries, except arguably the first, were disastrous bacchanalias of indiscriminate slaughter, confusion, & anti-Semitism, with tens of thousands of crusaders, pagans, Jews, and Muslims murdered. 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.

Political Theory: Under pressure, King John signed the Magna Carta, giving certain rights to English nobles (not to commoners). It was the most important landmark in the tradition of the supremacy of the law over the king’s will.
Innocent 3 convened the 4th 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, and outlawed trial by ordeal among priests. This opened the way for trial by jury in secular trials. The Council officially sanctioned torture in aid of Inquisitions. 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.

Dominic
Dominic, Spanish, founded the Dominicans (vow of poverty) to assist punishing heresies. He ordered his friars not to learn secular sciences or liberal arts except by dispensation. He was canonized by Gregory 9 in 1234.

Averroës’s clear analyses of Aristotle were widely read. Averroës 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. He & Maimonides revived Aristotle’s philosophy. Pope Honorius 3 sent Dominicans (and in 1230, Franciscans) to Paris to try to stem the tide of free thought. The Dominicans bitterly attacked Averroësism (adopted as well by Maimonides), said it was subversive of the merits of the saints. It was too late. Jews in Spain under the Muslims prospered, became scholars, physicians, & treasurers managing public finances.

Science: Albertus Magnus/Albert the Great (c1193-1280), Dominican, in Paris, a hotbed of doctrinal discussions, including the doctrine of Universals, important then. He taught Thomas Aquinas. He was the first representative of humanism in the Middle Ages, first to separate knowledge from dogma, he stressed importance of observation & experiment, empiricism. He advocated the peaceful co-existence of science/natural philosophy with religion.

He is considered to be the greatest German philosopher & theologian of the Middle Ages. Said, “Natural philosophy does not consist in ratifying what others have said but in seeking the causes of phenomena.” Said that the Earth is a sphere, & all things have causes. His superiors accused Albertus of sorcery, forced him to stop studying science & study only dogma. (In 1310, Dante made Albertus’s doctrine of free will the basis for his ethical system.).

The Council of Toulouse formed the first court of the Inquisition. It forbade non-clergy from owning a bible. To prevent ordinary people from learning scientific subjects, the Church banned such discussions in the vernacular languages.

Innocent 3 established the “Roman” Inquisition under his control. He assigned Dominicans to administer it. The Church was relentless in punishing heresy (thinking or speaking unapproved ideas). It used torture & burning routinely. In the first half of the 13th century, inquisitions were established in Lombardy, the Marches, Romagna, Tuscany, the Balearic islands, Aragon, and some cities in France and Germany.

As inquisitions intruded on civil power, there were frequent jurisdictional disputes between these two groups. The Church in the 1200s derived income greater than that of all the secular rulers combined from its large land holdings, and from fees to perform marriages, confirmations, etc, offerings, and from the ecclesiastical courts.

Robert Grosseteste (1168-1253), was the central figure in England in the intellectual movement of the early 1200s. Familiar with Aristotle, he wrote about the nature of scientific inquiry. Natural philosophy began with Man’s experience of phenomena and tried to determine the causes/reasons for such experience. Then, to analyze such causes, break them down into their component principles. Then reconstruct the principles into the observed phenomenon based on a hypothesis, and finally, verify the hypothesis by observation.

Bishop of Lincoln Robert Grosseteste was one of the first to use the experimental method. He analyzed the natural phenomena, showing how some were dependent on others. Optics & astronomy were subordinate to geometry. Optics was the basic physical science. Like al-Haytham, he wrote about direct visual light rays, reflected light, refracted light, & the formation of a rainbow. Grosseteste & his student, Roger Bacon, further developed the scientific method advanced by Hayyam, Biruni, al-Haytham, Avicenna, & Peter Abelard. Their method of investigation was more important than their results.

Ibn al-Nafis (1213-1288), 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. His book wasn’t known in the West until 1924. His work on the circulation of blood was not surpassed until Harvey in 1628.

Roger Bacon (c1214-1294) Brit., Dominican, philosopher and greatest scientist of his time, studied and taught at Oxford until c1241, where he became well versed in Aristotle. He joined the faculty at Paris to teach Aristotle. (Aristotle had been banned at Paris as non-Christian and was being reintroduced.) Bacon suggested lenses to help eyesight, sailing west to reach China, wrote that China used gunpowder to shoot arrows from bamboo tubes. (Windmills, first used in Persia c700, began to be used in China in the 1200s to grind grain.)

Bacon returned to Oxford; studied math and natural philosophy. In studying the natural world, he advocated studying non-Christian scholars as Aristotle & al-Haytham (Optics). In an age when experimenting could cost a man his life, he experimented. He suggested lenses to help vision. He became a Franciscan monk c1252. (more Bacon 1267).
Dominicans forbade members of their order from studying medicine and natural philosophy, i.e., science. Both the Dominicans and Franciscans condemned research by experiment and observation. Historian F J C Hearnshaw described the state of Biblical studies, “During [c400-1300] history as a science was unknown. It was the hand-maiden of theology - a subordinate whose duty was to supply anecdotes by means of which the moralists pointed their sermons, examples by way of which religious philosophers conveyed their teaching.”

c1250 Jalal ad Din Muhammad Balkhi, known as Rumi, famous Persian poet, believed in the use of music, poetry, & dance as a way to reach God. Wrote Masvani, an epic poem with fables, scenes from everyday life and Koranic verses.

1252 Innocent 4 authorized torture by inquisitors to extract confessions from possible heretics. Torture violated English law, so in 1256, Pope Clement 5, citing Canon law, commanded English king Edward 2 to torture suspected heretics.

1258 Mongol Empire: Hulagu Khan, another grandson of Genghis Khan, led a Mongol army, looted and destroyed Baghdad, a religious capital of Islam, with libraries, scientific institutions, laboratories, and a canal system. Hulagu killed 200K-1M Muslims. The Mongols then imposed a Pax Mongolia, permitting trade with the West and tolerant of Christians and Muslims, and made Peking/Beijing their capital. The empires of Persia, China, and the Ottoman Empire were all larger than Western states. In the thirteenth century BC, Zen Buddhism, which held doubt of supernatural powers as its central tenet, came to Japan and became popular with the Japanese military.

1267 Roger Bacon: In 1257, for seeking scientific explanations for matters ascribed to God, Bacon’s order forbade him to lecture, ordered him back to Paris to be kept under surveillance in a Franciscan friary there. He was kept there for 10 years, until 1267. While there, in 1264, he suggested to Cardinal de Foulques that he write a book on natural philosophy in order to benefit the Church. De Foulques soon became Pope Clement 4 & in 1266 asked Bacon to prepare a book containing treatises on grammar, logic, mathematics, physics, philology, & philosophy. In 1267 Bacon finished Opus Majus, recommending natural philosophies be taught at Paris, then the principal Christian university. Opus Majus discussed experiments with light shining through water droplets showing the colors of the rainbow. It foresaw the principles of telescopes & microscopes. Bacon built a magnifying glass. “We can shape transparent bodies & arrange them...that the rays will be bent in any way we desire, & 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 & stars in appearance to descend here below.” He said the speed of light is finite.

His optical predictions were not fulfilled for three centuries. The microscope was not made until 1595, the telescope in 1608. He devised formulas for extracting phosphorus, manganese, and bismuth. He said that the Earth was a sphere.

Opus Majus: “If in other natural philosophies we should arrive at certainty without doubt, it behooves us to place the foundations of knowledge in mathematics.” “Mathematics is the door and the key to the sciences.” He thus revived Pythagoras’s 5th 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.) Bacon explicitly credited al-Haytham’s development of the Scientific Method. His discussion of optics in Opus Majus was based on al-Haytham’s work. Clement 4 died before reading it and Bacon returned to Oxford, starting to write General Principles of Natural Philosophy.

1268 Roger Bacon’s Scientia Experimentalis urged using Induction. For him, there were four “stumbling blocks in the way of grasping the truth which hinder Man however learned;” they are: 1. Weak and unworthy authority. 2. feeling of the uninstructed crowd. 3. Long custom. and 4. Hiding of one’s ignorance in a display of apparent knowledge.

“There are two ways of acquiring knowledge, ... reasoning and experience, [later known as rationalism and empiricism]” Bacon 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. In 1271, he wrote Compendium Studii Philosophiae attacking clerical ignorance. Even though his writings showed that he wanted to strengthen Christianity, in 1278, his order imprisoned him in solitary confinement for having “suspected novelties” in his teaching. He was released only in 1290 at age 80 when a new friar took over the Franciscans. Thus the Church imprisoned or confined the greatest scientist of his time for almost half of his adult life simply for his ideas. He was of greater significance to mankind than any king or emperor of his time.

1269 Kublai Khan in Peking asked the pope to send 100 teachers to educate his Mongols; but there was no pope. In 1271, new pope Gregory 10 sent two Dominicans who started out with the Polos, They soon turned back.

1269+ Aquinas Thomas Aquinas /Thomas de Aquino (c1225-1274), student of Albertus, the leading philosopher of the Christian Church, greatly influenced by Aristotle, greatest proponent of papal supremacy versus kings, first a Benedictine (studied at Monte Cassino), then a Dominican. He was the revival of the theological spirit of the 13th century.

Faith is the greatest virtue. Albertus, Grosseteste, & Roger Bacon had practically initiated the experimental method in science. Aquinas gave all his thoughts to bringing natural philosophy again under theological methods & ecclesiastical control. Said, all knowledge proceeds from first principles, which were themselves based on faith. There were only 3 truths that could not be proven by reason, the creation of the universe, the Trinity, & Jesus’ role in salvation, & so must be accepted on faith. He constructed the second great synthesis of Christian thinking. Aquinas realized the intellectual
Faith is more than belief. Power of reason wanted to base religion on more than just faith. “Reason in Man is like God in the world.” Reason is a gift of God. He wanted to unite Augustine’s two cities of God and Man. He said greed is a sin against God. Man is at the juncture between Augustine’s two cities. Man has a body & a soul. There is unity in truth. Natural reason can prove some things, i.e., 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.

1270 Bishop Tempier of Paris condemned 13 propositions of Aristotle and Averroes as heretical and excommunicating anyone who supported them. (In 1277 Tempier issued a more comprehensive condemnation.)

1273 Summa: In his great work, Summa Theologica (1265-74), unfinished when he died at 47, Aquinas worked out a new philosophical and theological system which attempted to reconcile reason (Aristotle) with revelation (revealed dogma). Man requires more than philosophy in his search for truth: certain truths are beyond human reason and are available only because of divine revelation. After hundreds of years where the Church denied reason out of hand, this invocation of Aristotle’s rational thinking brought reason into theology & into Western thought & made it respectable for reason and faith to co-exist. Summa could find only 2 objections to the existence of God, 1. Natural philosophy / science could apparently explain everything we experience without God; & 2. the Problem of Evil.

Aquinas answers to the Problem of Evil

Aquinas posed four answers to the Problem of Evil. In sum, 1. Evil is not a thing. 2. Man can’t understand why God does things (Man is too dumb). 3. We can’t say all suffering is bad, & 4. Man has free will (i.e., including to do evil)

He said that there are two sources of knowledge, the mysteries of the Christian faith & the truths of reason. He subordinated reason to the dogma of the Church. “There can be no falsehood anywhere in the literal sense of Holy Scripture.” Revelation gives men mysteries, to be believed even though they cannot be understood.... all that natural philosophies [sciences] had discovered about the world revealed the existence of the highest being, the Christian God. Aquinas defined the 4 cardinal virtues, binding on everyone, as prudence, temperance, justice, and fortitude. God’s principal attributes are simplicity, actuality, perfection, goodness, infinitude, immutability, unity, and immanence.

Summa included the following surprising passage. “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.” But Aquinas’s answer, revelation. We need a first cause, a prime mover.

Thus, Aquinas’s position was between Plato’s Nominalism and Realism (every existing thing requires two elements, its form and its matter, The form of a Man is his humanness, a universal; the matter of a Man is his individuality). But everyone had a “station in life.” Also, There can be no falsehood anywhere in the literal sense of the Holy Scripture. He said demons could produce wind, storm and rain of fire from Heaven. He defended the Inquisition and slavery. He also thought the planets affect men’s actions (astrology) but that using reason, Man could overcome such forces.

1273 Summa said, “In marriage, man receives by divine institution the facility to use his wife for the begetting of children.” He said that a man is useful in the education of children as men are more rational than women.

He argued that these subordinations benefit natural law and philosophy. He said that reason can only take one so far and then faith “perfects” reason. Summa was organized according to the dialectic method of the scholastics. He posed a question, cited sources that offered a opposing view, and resolved them by arriving at his conclusion.

Aquinas thus fused Christianity with Greek & Arabic natural philosophy, scholasticism whose basic tenet is that there can be no contradiction between the truths which God has revealed, & 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 became dominant & merged into Christian dogma with all Aristotle errors (p. 26). But dogma, as the word of God, cannot be revised, where scientific ideas change with new knowledge.

Aristotle and Averroes should be excommunicated and killed. He said “The sin of unbelief (a thought crime) is greater than any sin that occurs in the perversion of morals.” Summa argued that punishment depends on whom one harms. Hit someone in authority gains a greater punishment than hitting a low born person. Strike God, the infinite majesty, and get the greatest punishment, Hell. Killing heretics was not only appropriate but necessary to defend the salvation of the faithful. The concept of sin was an overpowering influence on one’s mind.

Aquinas, “We cannot know what God is but what he is not.” Summa quoted Aristotle c3,500 times and Pseudo-Dionysius c1700 times.

Aquinas believed one could know that God existed through reason, so Summa (1.q. 2.a.3) posited five inferential arguments to prove God’s existence. He thought a loving God had placed Man here on Earth full of intellectual puzzles, equipped with a thinking brain to deal with these puzzles. Had God really meant for Man not to think? Had
God intended Man to pass though this Earth with blinders, only with his eyes on another existence in the future after he is dead? The question, as posed, answers itself.

While Aquinas believed God’s existence was self evident, he rejected Anselm’s Ontological Argument as he didn’t think it could be deduced from claims about the Western concept of God. He said that not everyone who hears the word “God” understands it to mean something which nothing greater can be thought. And doesn’t necessarily understands what the word signifies actually, only that it exists mentally. So he devised five proofs for God.

Aquinas’s five proofs derive from a rational understanding of the ordinary objects that we experience with our senses. In Man’s ordinary experience; he sees events causing other events. The chief characteristic of all sense objects is that their existence requires a cause, which itself requires a cause, etc., etc. Aquinas’s proofs tell of aspects of God’s nature. Arguments 1-4 are Cosmological / First Cause arguments. 5 is a Teleological / Design argument. Thus, 4 proofs are based on causality and the impossibility of an infinite regress. They thus appeal to Man’s “common sense.”

1. **Aquinas’s Proof from Motion:** Nothing moves unless something moves it, which itself was caused to move, and so on. So, there must have been a First Unmoved Mover. That was God. This makes God unchangeable and eternal.

2. **Proof from Degree of Goodness:** “We see that things in the world differ in goodness or perfection, measured against some maximum goodness or perfection. As humans are good and bad, maximum goodness cannot rest in humans. So there must be some other maximum to set the standard for perfection. That is God.”

3. **Proof from Necessary versus Possible Being:** “There are things that are possible to be and not to be,” i.e., a tree. If all things in reality were only possible, then there was a time when nothing existed. But if there were a time when nothing existed, then “Because that which does not exist begins to exist only through something else existing. But things do exist, so not all things are merely possible. There must exist something the existence of which is necessary.” So, “Some being having of itself its own necessity, and not receiving it from something else,” is God. This is a variant of the Proof from Efficient Cause Argument, just below. Without God’s perpetual creative support, the world lapses into nothingness. This makes God pure actuality. (Leibniz also advanced this argument, 1710.)

But, saying God is a necessary being means that the proposition “God exists” is a necessary proposition. But this is the claim of the Ontological Argument. Thus this Cosmological Argument reduces to the Ontological Argument. And if the Ontological Argument is not sound, neither is the Cosmological Argument.

4. **Proof from Efficient Cause:** Aquinas adapted Aristotle’s, Maimonides, and al-Ghazali’s Cosmological Argument. Nothing exists prior to itself. A statue requires as its cause a sculptor, quarrymen, etc. But we can’t go back infinitely for then there would be no things existing now. Therefore there must have been a first efficient cause. That is God. This argument makes God omnipotent. First Cause arguments assume that the universe needed a cause, seemingly logical, but which came to be doubted when quantum theory arrived in the 1900s.

5. **Proof from the Order of the Universe**, the Teleological / Design Argument. “The order and complexity of the world infers that some intelligent being exists which directs all natural things to their ends and this being we call God.” This Teleological Argument infers that the world was designed and asserts that the design is a good if not excellent design. [Neil Shubin’s Your Inner Fish in 2008 demolished this idea.] The Teleological Argument had been posited by Anaxagoras, Plato, and Aristotle but was not important until Aquinas expounded it.

Aquinas confused design with order. There can be (and is) order without a designer. He did not conceive of the correct answer; order can evolve by natural selection, which came in 1859. (See Hume 1779, re Design Argument)

**All Aquinas’s arguments are God by Inference (Inductive) arguments, i.e., “There’s certain evidence in the natural world that infers that a God exists.” They posit a mystery, a god, to solve a scientific problem, the origin of the universe.**

**Cosmological / first cause arguments by themselves don’t get one very far.** They purport only to prove that at one time a supernatural force caused the universe. By itself, it’s the deist argument (see 1624). They do not show, or even assert, that such force is active today or was loving or wise or even competent (a god worthy of worship), or a Christian, Muslim, or Costa Rican God, or his/ her/ its character, motive or purpose, if any, or a personal god that answers prayers, etc. Hume in 1751 & 1779 and Russell in 1912 posited arguments to refute Aquinas’s arguments.

**Chain of Being**

Aquinas also described a hierarchical and interconnected seamless universe, the Chain of Being (akin to Plato’s and Origen’s), with God at the top, then angels, then Man, then animals, plants, air, earth, fire, water.

Aquinas also laid out the criteria of Augustine’s approval of a “just war.” 1. It must be waged by a proper authority, such as the state (proper authority represents the common good) 2. It must have a good and just purpose, 3. Peace must be the central motive even in the midst of violence.

**Political Theory**

Aquinas said a monarchy was the best government. He advanced law by defining it 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. Here law was a volitional act of Man. Government was/is to lead citizens to live virtuously. Contrary to Aristotle’s ideal of a city state, Aquinas argued that a nation is preferable as it is more self-sufficient & resourceful.
Problem of Evil

Re the Problem of Evil and “omnipotence paradoxes”, he said God could do anything logically possible. “Nothing that implies a contradiction [dry water, square circle, etc.] is within God’s omnipotence.” This is more reasonable than Augustine’s (God could do anything he wished to) but still unsatisfactory as what is “logically possible” is massively unclear and increases daily as science advances. For Aquinas, both moral and natural evils exist for the sake of a more positive good. He thus purported to know God had such purpose. He adopted Augustine’s Argument from Aesthetics / Beauty. Beauty exists, so God must have done it, a variant of the Design Argument.

Faith

Aquinas’s attempt to reconcile dogma and reason was disputed from both sides; by strict believers who said that reason intruded improperly into the mythical communion between God and Man, as well as by those who saw no evidence for a God and believed that reason did not have to accord to the ruler of the City of God, whoever/whatever he/it may be. All of Christian thought may be seen as variations on the essential positions of Augustine, a Platonist, and Aquinas, an Aristotelian. Similarly, the history of philosophy may be seen as variations on the works of Plato and Aristotle. Most importantly, *Summa* moved the Medieval mind toward full intellectual independence.

1277 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. Bishop Tempier of Paris prohibited teaching 219 philosophical and theological theses on pain of excommunication, including certain teachings of Averroés, Aquinas, and Aristotle. Tempier sought to clarify that God’s absolute power transcended any principles of logic that Aristotle or Averroes might put on it. Some interpret Tempier’s act as evidence that rational thinking was so alive in the 13th century that he felt compelled to fight it. But, in 50 years, Aquinas was seen as the Church’s most eminent scholar.

c1290 God can do anything

Dogma: John Duns Scotus (1265-1308), from Duns, Scotland, Franciscan, popular 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 & scientific reasoning from dogma. Whereas Aquinas had said God’s powers were limited by what was logical, Scotus said that God is not circumscribed in any way whatsoever, least of all by the human mind. God is absolutely free & absolute freedom means being free of reason, as well as all else.

Edward 1 expelled Jews from England, stole their property, citing usury. Many Jews “converted” and stayed.

1292-1298 Marco Polo (1254-1324), born in Korcula (under Venice). In 1271, at 16, with his father and uncle (who had been there before) went by caravan to the Mongol court of Kublai Khan at Peking. Their trip took 3 years, transferring from caravan to caravan. [Caravans go back and forth in limited territories. Only the most expensive goods could profitably be transported over the Silk Road.] They stayed, getting rich trading. Polo also became a diplomat for Kublai.

In 1292, Polo’s boat trip back to Venice (richest city in the West) took two years. In 1298, as a war prisoner in Genoa, Polo told his adventures. Rusticello da Pisa wrote them up. It was widely read. China’s grandeur was described.

Polo’s description of China, Burma, Siam, Java, & Sumatra was virtually the only Western knowledge of Asia for centuries. Polo noted that the great Chinese junkards had bulkheads & used a center rudder, better than the steer boards used in the Med. Polo asserted that the Earth was a sphere and so China could be reached by sailing west from Europe. Europe was still c98% illiterate, including the feudal lords. Very few could add or subtract.

China kept its lead in grandeur over Europe until the 16th century and the spread of printed books & education in Europe.

1300 Pope Boniface 8, a ruthless and politically active pope, instituted the year of the Jubilee, when plenary (absolute) indulgence was granted to all Christians who visited Rome, preformed certain ceremonies, and donated money. (Originally planned as an event each century, it was so profitable, it was changed to every 25 years.) Boniface destroyed his political rivals, the Colonnas by killing all 6000 residents of their home town, Palestrina, and nearby areas, and reducing the town to rubble.

By 1300, most Arabic (and thus Greek) science & philosophy had been transmitted to Spain / Cordoba / Toledo. As the route to France was through the Pyrenees, the towns of Southern France benefitted. Montpelier became the chief center of astronomical & medical studies in France. Abbot Peter the Venerable translated the Koran into Latin. Boniface 8’s 1302 bull, Unam Sanctum, decreed that belief in the sovereignty of the pope over every human was absolutely necessary for salvation, the most extreme claim ever made by a pope. He used two years of papal revenue to buy land and cities that he then gave to his family. He had made several relatives cardinals. Dante’s Divine Comedy put Boniface in the circles of fraud, destined for the lowest circles of Hell (Inferno).

Background: Arbitrary end of the Middle Ages and beginning of The Renaissance / Rebirth (of classical culture) and capitalism, which started in Florence. The forces of nationalism and royalty began to assert themselves at the expense of the power of the pope. Popes had made Hadrian’s Tomb on the Tiber into a fortress to be safe from Rome’s starving populace. The center of Western Civilization, such as it was, through the Dark Ages, was Rome.
The Renaissance did not look forward; it looked back to Greek and Roman rational thinking and knowledge, literature, art, architecture. Humanism, the spirit of inquiry, and the notion that Man was the center of concern developed. While the concept of a rebirth of classical learning beginning around 1300 is an approximation, important changes in scholarship were underway in the 1200s.

While Europe emerged from its Dark Ages, the largest empires, the “gunpowder empires,” China, India, and the Ottoman Empire, were at their peak. Constantinople was the largest and most sophisticated Western city. Mechanical clocks (c1270), using weights or springs, began to replace water driven clocks, let men 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, & evolved into nation states. The world began to be known. A modern scholar, Piero Scaruffi posits that the greatest invention of the Renaissance was the knowledge of self.


Universities created a class of thinkers, collected Spanish Muslims’ translations of Greek texts into Arabic, then into Latin, which helped spread the Renaissance. In Italy, three kinds of schools developed, those run by cities, private schools, and abaco schools, essentially trade schools for young men to learn accounting and business.

The Renaissance spread slowly from Florence to the rest of Europe, reaching North Europe only two centuries later.

Writing became more readable

Daily life: The fastest transportation was still at walking speed. Roads were wagon trails. Wagons on the main road from Frankfurt to Berlin were limited in width to the space between two houses (still there) in Gelnhausen, a small village east of Frankfurt. Few traveled. Craft guilds were organized to protect their monopolies. The idea of self-governing city-states spread. Three-field rotation (wheat/rye, oats/legumes, fallow) and the horseshoe in N. Europe increased crop output, spurred growth of cities.

Many complained about the Church’s corruption. Venice signed a trade treaty with Egypt. In writing, word separation, punctuation, the stabilization of word order, subject-verb-object, table of contents, cross references, alphabetization, chapter headings, running headlines and such began to be used. Reading became easier and thus more widespread. Town clocks were at first bell towers. (German glocke = bell.)

Rabbis prohibited Jews under 25 from reading Maimonides’s 1190 Guide for the Perplexed.

Pope or HRE emperor: who was more powerful? It fluctuated, depending on the character of the particular

In 1305, Philip 4 pressed the cardinals in Rome to elect his bishop of Bordeaux as Pope Clement 5, who set up his court in Avignon, part of the Papal See. He never went to Rome. He named 4 “nephews” as cardinals. Rulers of the new nation states of Europe, thereafter paid only lip service to the sovereignty of the pope, seeing him, accurately, as merely a tool of the French king. It also sparked the conciliar movement. (Bishops in councils wanted to set church policies, rather than the pope) Christians lived under the terrifying threats of Hell and torture from inquisitions on Earth.

The chronic warfare & extreme disunity in Western Europe ironically contributed to its rapid cultural & economic growth, as unending competition among rival polities & philosophies kept society fluid & encouraged innovation.

Italy, trading importing goods from the Orient for sale in Europe, developed managerial & banking systems.


Natural philosophy: Theodoric of Freiberg, a Dominican, following al-Haytham, did 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 dissemination of ideas among scholars still relied on talking or hand-copied documents, very inefficient.

Dante Alighieri (1265-1321) in 1296 had been banished for life from Florence for backing the wrong politician. His Divina Commedia/The Divine Comedy (in Tuscan / Italian, not Latin), a masterpiece, a journey through the afterlife, three places, Inferno, Purgatorio, & Paradiso. In Hell, he found corrupt clergy and sinners, interesting place, Purgatory, Heaven (boring), where Dante met all the great competing theologians who lived together there in peace and harmony.

Thus the Middle Ages ended in splendor and abject failure, unrealistic. Divine Comedy was anti-clerical but deeply Christian. Dante’s De Monarchia c1317 argued for a world monarch to assure peace, necessary for human happiness. So, it was put on the Index of Prohibited Books when Pope Paul 4 instituted the Index in 1559.
Dogma: Christian fear of witchcraft was so severe that Pope John 22, in Avignon, issued a bull, *Spondent pariter*, aimed at alchemists, but which crippled the rudimentary science of chemistry. In 1320, he authorized the Inquisition to prosecute sorcery & urged princes to fight it. Christian fear of & hatred against the study of Nature was felt for centuries. Chemistry came to be known as one of the “Seven Devilish Arts.” Pope John 22, the “Banker of Avignon,” created the complex financial system that made the papacy far richer through simony & other devices. He destroyed friars who argued that Jesus & the disciples were poor. Petrarch disparagingly named Avignon Babylon.

Political Theory, Democracy: Marsilius of Padua / Marsiglio da Padova (c1275-c1343) wrote *Defensor Pacis*, called by some as “the greatest and most original political treatise of the Middle Ages.” Marsiglio held that the legislator is the majority of the people that the majority had the right to punish princes. He wanted the HRE independent of the pope and the prerogatives usurped by the pope. This was of course heresy. He advocated popular sovereignty to the Church as well. It started the new form of opposition to the pope. Local councils, including the laity elect representatives to the General Council which could, *inter alia*, excommunicate the pope and interpret Scripture. He wanted to preserve the unity of the Church, but democratically, not by papal absolutism.

Building on Aristotle's doctrine that the end of government is to enable persons to live a cultured life, he said a state was necessary, with a hierarchy within that state, and a sovereign to adjudicate conflicts, & make & enforce law. He wrote that popular sovereignty/democracy is desirable as pooling political wisdom brings better laws & can better perceive flaws in laws, so fewer will be harmed by laws. & such laws are more apt to represent the common good, such laws are more likely to be obeyed. The executive should spring from the common will. So, elect a king. For publishing his democratic ideas, he was excommunicated. (To a believing Christian, this is a condemnation to Hell.)

Ibn Battuta, an Arab, traveled to India and China. His stories were taught in Muslim schools in Cordoba and Toledo.

Philosophy, Faith made safe from reason: Scholars critically examining Aristotle found errors. A new intellectual spirit was developing. William of Ockham / Occam (c1290-c1350), Brit. a Franciscan friar, separated faith from knowledge, philosophy from theology, logic from metaphysics. He was one of the principal agents of the dissolution of Aquinas's synthesis of natural philosophy & theology. Like Duns Scotus, he said that faith & reason have nothing in common. Reason can know nothing of faith. God is outside the realm of reason & 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, & in a sense, skeptical view regarding knowledge. God can affect our intuitive cognitions. 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 is the cause of the natural order.” He concluded that we can know nothing about God but only that the unaided reason cannot discover God. All knowledge derived from experience, made possible by reflection on experience, depends on prior intuitive sense experience of things.

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 and 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, so he was excommunicated and jailed. He escaped to the protection of German princes. He did away with Aquinas's notion that Plato's realism, (universals, ideas like red, small, good are real).

Ockham argued that only real things were real things; & universals were merely descriptions, inventions of man's mind, words / names, i.e., *nominalism*. This was his central principle, to deny the reality of universals outside the human mind & human language. Once his razor (below) cut away universals one couldn’t scientifically prove, God's existence or other tenets of faith like dogma was a matter of revelation & science was a matter of discovery. He was still a firm believer, said that there were no objective moral values apart from God's commands. Ockham & Marsiglio (ref. 1324) were colleagues.

Ockham's razor, i.e., “Cut away the irrelevant, accept the explanation with the fewest assumptions.” (Note, the simplest explanation is not always the most accurate.) His hypothetical razor dispensed with God, but put God safely in another frame of reference, theology. He advocated the primacy of logic in all disciplines. Like Abelard, Albertus, Aquinas, Averroes, & Duns Scotus, Ockham made a distinction between theological & philosophical/reason-based truth. He wrote, “The Truths of God (dealing with salvation) are 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. So reason, freed from the Church, flourished.

Politically, he favored a monarchy bound by natural law (respect private property.) & by international usages. The state should promote virtue, dispense justice, make laws, & most importantly, punish law breakers. Ockham rejected the pope's power in the secular realm; said that religious orders should own no property or wealth. So, in 1339, his works were put under a ban & solemnly condemned. The Renaissance showed scholars a variety of opinions among Greeks. (In the *Age of Reason/The Enlightenment*, 18th century, reason burst through the wall & demolished faith.)

Philosophy, Humanism, the concentration on the human rather than the divine: Humanism was more concerned
with re-establishing the secular values of the Greeks and Romans than reviving their science. Francesco Petrarca / Petrarach (1304-1374), the first great Humanist, loved the joy of living. He was the first to realize that the Dark Ages had been a period of decline in human knowledge from the grandeur of Rome.

At 35, Petrarach was one of Europe’s most famous scholars, poet laureate of Rome. He is often considered the father of the Italian Renaissance. He started a search of monasteries for forgotten Latin manuscripts. Petrarach wrote of the joys & sorrows of real people. He emphasized the use of pure classical Latin, so scholars could use Cicero as a model for prose & Virgil for poetry. Humanists were of course skeptical of supernaturalism.

Artists became famous and wealthy. Humanists believed that knowledge came from human observation and analysis rather than from supernatural powers, that the “liberal studies,” history, moral philosophy, rhetoric, letters (grammar and logic), poetry, math, astronomy, and music, were the key to true freedom.

c1340

Ala al-Din Abu’l Hasan Ali ibn Ibrahim ibn al-Shatir (1304-1374) devised a non-Ptolemaic (but still geocentric) model of the Sun, Moon, and planets that reformed the Ptolemaic model and eliminated the epicenter of the solar model.

1345

Petrarch found a volume of lost letters of Cicero he had sought for years, personal, friendly, conversational, unlike formal Medieval writing. One historian calls this event the start of the Renaissance. (More Petrarach 1352, 1395).

All written materials were hand copied and rare. Some monks spent their lives just copying manuscripts.

1347-49

Black Death, from bacteria in fleas on rats, migrated from Asia on a ship that docked in Messina, killed 1/3 to ½ of Europe and the Near East and much of the rest of the world. Venice made visitors wait outside the city 40 days. (Hence the word quarantine) People moved to the cities. Farm land reverted to forests. It was the modern world’s most devastating natural disaster. Survivors inherited land, money, houses, clothes. More private chapels were built and charities founded and mysticism arose. Gunpowder began to be used in primitive cannons at Creyc.

Trade fell drastically, but it caused several significant results: labor being scarce, went up in value, landlords had to treat peasants better; it prompted investments in technological innovation in industry, textiles, mining, & banking. Plus excess clothes were made into paper, which, in the 1400s, helped the spread of printing. By this time, many German states / principalities / fiefdoms / dukiches / bishoprics had expelled Jews and stolen their property.

1352

Giovanni Boccaccio (1313-1375), wrote The Decameron in Italian, celebrating the sensual nature of Man. With his friend Petrarach, he attempted to revive classical, i.e., Greek, culture. The humanism stimulated by classical learning penetrated every aspect of cultural life, broadening it beyond the confines of the religious symbolism central to the Medieval mind. Spectacles were in use by 1352, as Tommaso da Modena depicted them in a church fresco.

c1376

Christianity: For centuries the Church had been deeply corrupt, selling Church offices, selling sacraments, nepotism, debauchery, occasional murder. John Wycliffe (1320-1384), an English priest, a forerunner of the Reformation, who taught dogma and philosophy at Oxford, criticized the Church hierarchy. In 1382, translated the Vulgate Bible into English. Said, “This Bible is of the people, by the people and for the people.” He preached against the pervasive corruption in the Church, said that Christ is Man’s only lord, the Scriptures are supreme authority, and the Church bureaucracy was not needed to attain the state of grace. (Martin Luther said the same 140 years later.)

Wycliffe taught that property was a result of sin, that Jesus and the apostles had no property, nor should clergy. Said, there’s no biblical support for a pope, cardinals, or riches. This rebuked the Clergy, but not Christ. Said, “I believe that in the end truth will conquer.” So the Church hierarchy expelled him from Oxford, condemned him as a heretic, ordered him jailed. In 1408, The 3rd Synod of Oxford prohibited unauthorized-Wycliffe versions of the Bible. William’s Vision of Piers Plowman, 1377, by William Langland, an allegorical poem also contrasted the suffering honest poor with the corrupt high clergy. (“There are none harder nor hungrier than men of Holy Church.”)

c1377

Ibn Khaldun (1332-1406) “conceived & formulated a philosophy of history which is undoubtedly the greatest work of its kind that has ever been created by any mind in any time or place,” said Toynbee. Khaldun was a government official in several N. African states & Spain. Writing in a time when settled areas were smaller & surrounded by vast ungoverned areas populated by nomads, his 1377 Muqadimmat / Introduction to History explained the rise & fall of states as a constant renewal or replacement of the settled ruling group by nomads conquering the towns, then in four generations losing the hardness of the desert & acquiring the vices & slackness of town life, & being replaced by hardier invaders from the desert. Although the world has vastly changed, the concept contains valid insights. Khaldun explained the demise of science in Islam (al-Ghazali) by saying that science only thrives in affluent societies.

1378-1417

Great Western Schism. While the popes resided in Avignon (1305-1377), the so-called Babylonian Captivity, they appointed 134 new cardinals, 113 of whom were French. In Avignon, the popes (all French) & his cardinals lived in obscene splendor, discrediting the papacy, and giving rise to critics like Geert de Groote (1380 just below) and Jan Hus (1388), some calling for the pope to return to Rome. So in 1377, Pope Gregory 11 returned to Rome, ending the Avignon Babylonian Captivity. Gregory died in 1378. Cardinals were wealthy, sharing their revenues of the papacy.
Romans pressured the cardinals to elect an Italian as pope. They elected Italian Urban 6. His opening address to the cardinals personally attacked them for their lust for power, their scandalous wealth from simony, their neglect of their duties, their immorality, accurately called one a fool, one a liar, one a bandit. So the insulted French cardinals, now a majority of cardinals, elected a French pope, Robert of Geneva/ Clement 7, who moved to Avignon. This Clement 7 is now considered an anti-pope. (Another Clement 7 considered legitimate was pope in 1523).

In Rome, Urban 6 appointed many Italian cardinals and established his Curia there. So, there were two popes, in Rome and in Avignon, the Schism. The nobles of Scotland, France, Spain and S. Italy supported French Clement 7, England, Germany, Scandinavia, and N. Italy supported Urban 6. Urban 6 and Clement 7 called each other the Antichrist and excommunicated and cursed the other’s adherents. Each pope’s policies favored his patrons’ interests.

1380 Christianity: Geert de Groote (1340-1384), a lay man, walked around Holland, like Wycliffe, preaching a purer, simpler form of Christianity than exhibited by most clergy. His teachings attracted many, including scholars. The Brethren of the Common Life developed out of his preachings. Only after his death he was accepted by the pope.

1381 Peasant revolt. Wat Tyler’s Rebellion, 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 voiced the peasants’ response, “Good people, things cannot go right in England and never will, until goods are held in common and there are no more peasants and gentilfolk... 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 making us produce and grow the wealth that they spend?” “Whan Adam dalf (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 then reneged on his promises and helped by the nobles, arrested hundreds of rebels, and killed Tyler & Ball. Other similar revolts similarly failed. In 1396, France expelled c100,000 Jews.

c1397+ Florence: Cities became sovereign states, speaking their local languages which diminished the use of Latin, the language of European scholars. Florence emerged as a leader in commerce and the arts and became the richest city in Europe. In Florence, our modern idea of the artist as a genius and bohemian, operating by his own rules, first began. In 1397, the Medici family, great patrons of the arts, began lending money on an international scale, opening banks throughout Europe. Florentines, with their gold florin, which was accepted everywhere, became the first international bankers. Wealth became the main basis for class distinction, rather than birth.

The wealthy were also the intelligentsia. The textile industry was Florence’s largest, but entrepreneurs of all kinds came and flourished. Italian boys from ages 13-15 were taught business skills, arithmetic, weights and measures, multiplication table, bookkeeping, loans and interest, and business practices in abbaco schools. The temporal power of the Church was curtailed. Church lands were confiscated. Burghers and merchants ruled.

Humanism, Faith Humanism largely dominated the next 100 years of Florentine and Northern European educated persons. Augustine’s ascetic in the cave was gone. In his place was the man of the world. Education was for public life (thus principally for males), not Church life. Aquinas’s synthesis of faith and reason was unraveling. Humanists ridiculed Scholasticism as a preserve for meretricious verbalism & futile triviality. Many simply quietly began to ignore the Church.

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 and contacts with Muslims. Civic humanism: Florence gave humanism a new direction, away from Petrarch’s intellectual life as one of solitude to one of civic participation. Cicero became the Humanist’s model, as an intellectual and as a Man of civic duty.

1398-1415 Jan Hus / John Huss (1374-1415), the popular Rector of Karlova / Charles University in Prague, influenced by Wycliffe, preached against the corrupt clergy and the power of the pope. In 1410, the Archbishop of Prague excommunicated Hus and his followers and burned Wycliffe’s books. (See Council of Constance 1414.)

c1400 Background, the 15th century: Innumerable small states / principalities / free cities / bishoprics, with varying degrees of independence / sovereignly people Europe. While Latin remained the language of scholars and clerics, literature from Dante (Divine Comedy 1310) and Chaucer (Canterbury Tales) appeared in the local languages, although books (hand copied) were still expensive. Modern conceptions of God emerged between 1400 and 1800. In 1400, a Florentine brought Ptolemy’s second century map, Geographia, with grids, including the Canaries, Iceland, and Ceylon from Constantinople to Florence. Its view of the world had been forgotten for 1,000 years.

1405 Christine de Pizan, Venetian, widow with children, wrote critically against the prevailing male domination in all matters.

1405 China: Starting c1405, the Chinese general/ admiral, Zheng He / Cheng Ho, sailed from Nanking with 300 ships (many 5 times larger than Western ships, up to 400 feet (4 masts, 12 sails) and 28,000 men, provisioned for two years, a ship could carry 1,000 men, had a drop keel, and capstan), to dominate Indian Ocean trade. In seven trips, he sailed as far west as Hormuz (mouth of the Persian Gulf) and to East Africa and Malaysia. He had doctors, merchants, bankers, boat repairers, gifts of tea, silk, and porcelain. He brought back to China exotic animals like...
The Ar
ts

Heretic

1419+
c1 430

Prince

popes

The Council of Pisa: Bishops under both popes met on their own to resolve the Schism begun in 1378. They “deposed” both popes, and elected John 23 as pope. But the two sitting popes, Gregory 12 in Rome and Benedict 13 in Avignon, refused to resign, so there were three popes. Pope John 23 in 1411 excommunicated Hus.

Successive popes also worked steadily to undermine those conciliar reforms that diminished their powers. Hus was widely loved and respected. His murder sparked a revolution in Bohemia for 20 years. His “heresy” continued. The council ordered that Wycliffe’s remains be dug up and burned. (This was done in 1428, 44 years after he died.) The Church has never decided which popes, Rome or Avignon, were legitimate.

The Council of Constance, also convened to end the Schism, was the high point in the conciliar movement to reform the Church. HRE Emperor Sigismund promised Hus safe conduct to the Council in 1415. Hus came. He was promptly imprisoned and burned at the stake. Rome-based Pope Gregory 12 said, “When dealing with heretics, one is not obligated to keep one’s word.” Gregory 12 resigned and two years later, in 1417, the Council elected Pope Martin 5, who under pressure, agreed to convene councils every seven years.

On his election, however, he reaffirmed papal supremacy. He ruled from Rome and so ended the Schism. The Council condemned the doctrine of justifiable killing of tyrants, a doctrine favored by the Jesuits.

Limbo: Idea of a non-heaven, non-hell resting place for unbaptized infants grew to avoid the cruelty of Original Sin.

Aeneas Sylvius, later Pope Pius 2, visited England; wrote of primitive huts, peat fires, no chimneys, bread unknown in places, food was vegetables, sometimes bark, swarming with vermin, never a bath, no plumbing, straw beds.

Austria expelled thousands of Jews, stole their property. The Bible was always cited when Jews were persecuted.

Thomas a Kempis (1380-1471), Augustinian, wrote The Imitation of Christ, “At Judgment day, we will be not judged by what we have read but how we lived...It is much safer to obey than to rule.” Said one could talk directly to God.

Aeneas Sylvius, Pope Pius 2, visited England; wrote of primitive huts, peat fires, no chimneys, bread unknown in places, food was vegetables, sometimes bark, swarming with vermin, never a bath, no plumbing, straw beds.

Background. Classical Architecture revived: Florentines began to build in classical Roman/Greek forms, not Middle Age Gothic. Buildings put Man as their focal point. Geometry, trigonometry, & algebra were refined & used extensively. New Style in Painting. Florentines also began to paint in perspective, based on al-Haytham’s views on optics and a book by Leon Alberti, with a vanishing point where all parallel lines converged. Never done before. Perspective not used outside Western art. Perspective put Man’s viewpoint central, created a sense of movement in space. Sienese painters did not use perspective for 100 years. In 1420, 95% of paintings were religious; by 1520, 80%.

Council of Basel / Ferrara / Florence: Bishops and lesser clergy (a majority) met in Basel (outside the lands of the pope and the HRE) for the purpose of reforming the Church (i.e., weakening the pope.). It claimed supremacy over the pope, prescribed an oath for new popes to take, and took other actions weakening the pope. After moving to Ferrara and Florence, the council ended in Lausanne inconclusively. The weak pope survived.

Abruptly, just 59 years before Columbus’s journey, the Ming (Enlightened) Dynasty abandoned its Indian Ocean dominance and sealed itself off from foreigners, burning Zheng He’s ships, and forbidding even the construction of seagoing ships. They could have sailed east to California. Mings felt they couldn’t learn anything from inferior peoples. In fact, as Polo had described, their culture then was richer and grander than the West.

Dogma: Pope Eugene 4 issued bulls urging inquisitors to be more diligent finding and punishing magicians & witches.

giraffes. In China, faster growing varieties of rice increased crop yields (and population)
Trade with the East: After Ptolemy, map-making had deteriorated into useless religious cosmography. In the 1300s, the more accurate ancient Roman and Greek maps of the Mediterranean began to reappear. Venice and Italian cities monopolized trade with China through the Muslims who dominated the Indian Ocean. Ships couldn’t make long sea trips. The best Western ships, Arabian dhow, were clumsy. In the Indian Ocean, monsoon winds were generally north easterly in winter and south westerly in the summer.

Before 1453, Europe got pepper to preserve meat from the Spice Islands (Indonesia) over the Silk Road or by Chinese junks from Indonesia to Malacca, Malaysia. Muslim merchants then sailed them to Calicut (S. tip of India), then by dhow up the Red Sea, then by camel to Alexandria or Damascus. Italian merchants then took them to Europe. A trip could take a year. A better route to the East was needed. The Koran contained warnings that discouraged Arab traders venturing west of Madagascar. Merchants ruled the cities of Europe. They looked outside Europe’s boundaries.

Formal diplomacy developed between cities in the 1400s and 1500s, with permanent embassies, commercial treaties. China centrally governed, rich, and self sufficient, self-centered, did not care to explore the world.

1440  **Lorenzo Valla**, a humanist, court historian to King **Alfonso** of Naples, confirmed **Nicolas of Kues**’s proof that the *Donation of Constantine* document was a forgery. *Inter alia*, it referred to the bishop of Rome, Sylvester, as “pope” 200 years before the term “pope / papa” was applied to Rome’s bishop. The Church however continued to vouch for its authenticity for centuries. From his study of language, *Valla* also doubted that the *Apostles Creed* had been written by the apostles. So, the Inquisition found him heretical eight times, but *Alfonso* saved him from the stake.

1442  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.”  *Eugeni us* also remitted the sins of anyone fighting Saracens/Muslims.

Astronomy: Cardinal **Nicolas of Kues** (near Trier) (1401-1464), a radical Platonist, deepened the gap between rational and theological knowledge. “One cannot say anything authoritative about God due to His incomprehensibility. One can only acknowledge this impossibility.” His *Reconciliation of Opposites*. “If the universe is infinite (as he posited) 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.”

1450  **Neoplatonism**: In the second half of the 15th century, a dramatic upsurge in interest in *Plato* (as well as a mania for all things of classical Rome) occurred. **Cosimo de Medici**, the *de facto* ruler of Florence and head of the banking family, founded an academy where *Plato* was the chief subject of study, led by the priest **Marsilio Finici**. **Cosimo** commissioned **Finici** to translate and comment on *Plato’s* works. Grammar, rhetoric, history, poetry, allegory and ethics were taught to make men rational. **Finici** sought to synthesize Christianity and *Plato’s* works. *Neoplatonism* promoted the study of all spiritual and imaginative writing, from Egyptian and Hebrew to Zoroastrianism.

This *Neoplatonism* was based on two central ideas, the *Neoplatonic* 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 Man to God. Man was the link between the material world and the spiritual world, and Man’s highest duty was to ascend toward a union with God. The principal *Medieval* question remained, “How can I be saved?”

**Hermeticism**: Finici also translated the Greek work, *Corpus Hermeticum*, sparking the *Hermetic* movement, a new view of mankind, that humans had been created divine but had freely chosen to enter the material world, but could regain their divinity through a regenerative experience or purification of the soul. Thus regenerated, they had knowledge of God and of truth and had the ability to employ the powers of nature for beneficial purposes. *Hermeticism*, had its day and faded. It is now a very minor fringe sect.

1450+ Voyages of Discovery & Exploration: Around 1450, Prince **Henry’s** school developed the Mariner’s Quadrant, a star angle measuring device like the Greek/Arab astrolabe. It became widely used in the West, especially among the Portuguese. By promoting sea travel, Prince **Henry** made Portugal a first rate power. His ships reduced the size of the world. Spanish, English, Dutch, French, Portuguese, sailed the seas. Forests of Western Europe were cut down for the ships the new nations’ navies needed. England cut down much of Ireland’s forests around Dublin for its ships.

1452 **Slavery**: Pope **Nicholas 5** authorized the Portuguese to “attack, subject, & reduce to perpetual slavery the Saracens, pagans, & other enemies of Christ south of Cape Bojadour.” This further legitimized slavery by Christians. He repeated his advice in 1455. Portuguese sailors reached further and further down the west coast of Africa where from the Congo to Benin c1480 they found Muslim markets with African slaves they needed for the sugar plantations in Madeira.

1453  **The end of the HRE in the East**: Muslim Seljuk Turks captured Constantinople, blocking the “Silk Road,” converted the Christian churches like St. Sophia into mosques, obliterating their paintings depicting people. The Medici invited Greek speaking refugees with Greek texts to Florence, which helped spread the *Renaissance* & revive scientific inquiry. The Metropolitan of Moscow said Constantinople fell as it had deserted the true Orthodox faith. The HRE in the West was by then little more than a loose association of 300+ German feudal princes under the nominal head of an emperor.

1454  **Printing System, Gutenberg**: Chinese and Koreans had been printing with movable type for around three centuries.
No invention ever caught on so quickly. The classical texts printed brought classical ideas, long buried, to the small middle class, & encouraged a new less formal style of writing, thus securing Boccaccio’s & Petrarch’s ambition. A fortuitous conjunction of events, the availability of rag paper (from the plague), the printing press, & the sudden appearance of a large number of worthwhile manuscripts, including many Muslim translations of Greek texts from Constantinople, helped spread the Renaissance. Printing spread rapidly to the mercantile cities of Europe & became one of the first capitalist enterprises. The spread of knowledge and ideas outpaced all Church efforts to control it.

With the growing independence of non-Italian states, the pope became merely one Italian prince, engaged in Italian power politics. The new national monarchies in France, Spain & England had power in their states that neither the pope nor the emperor could interfere. 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 the most cultivated Italians, although not with more respect for natural philosophy. That came in the 17th century.

Peasants unaffected: Most persons, peasants, even in Europe, lived on as before. To the peasant, year after year, things did not change. The Medieval world was a world without facts, just Man’s experiences. Little travel; seven miles was the longest journey one took, as it enabled one 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.

Mathematics: Georg von Peuerbach, Austrian, published a book on 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.

Poggio Bracciolini had found Lucretius’s 58 BC On the Nature of Things in a monastery in 1417. It was the classical statement 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, A few hand-copies were made. Machiavelli had one. It was translated into Latin and printed spreading its knowledge. Montaigne quoted it extensively. Daniel Boorstin: Lucretius thus became one of the most influential figures in the Renaissance.

Dogma vs. reason; With Pope Sixtus 4’s approval, Ferdinand and Isabella instituted the Spanish Inquisition under their control to punish heretics. Isabella named her confessor, Tomas Cardinal de Torquemada, a Dominican, as Inquisitor-General. In its first year, the Inquisition burnt 2,000 persons, fined or imprisoned for life 17,000 others. Torquemada in 18 years, burnt 10,227 and otherwise punished 97,321, destroyed Hebrew Bibles, burnt 6000 Oriental books. The Vatican extorted vast sums to spare victims. One of the tortures used was pouring water onto a cloth on the face of a bound prisoner, causing agonizing suffocation. (Sixtus 4 named five of his “nephews” as cardinals.)

Theodore of Gaza put Aristotle’s Historia Plantarum, a good book on botany, into Latin giving it wider readership.

Dogma vs. reason: Pope Innocent 8 issued Summis Desiderantes, to let inquisitors in Germany torture and kill men & women for sorcery & magic. “Thou shall not suffer a witch to live.” Exodus 22:18. Two German inquisitors, Jacob Sprenger, Dean of the U. of Cologne, and Prior Henrich Kramer, Dominican monks, wrote a juridical and theological treatise on witchcraft for female, especially midwives. “All witchcraft comes from carnal lust, which was in women insatiable.” It instructed torture for all accused witches. Not confessing showed the Devil gave the accused strength; consequently there need be no limit as to the cruelty of the torture used.

So, under torture, tens of thousands confessed to being witches. Court records of these are still in Germany & Europe. (Pagans had rules limiting the severity of torture.) From 1450-1750, an estimated c100,000 people, 80% women, were tried for witchcraft and other heresies, including talking back to a priest, for having a child out of wedlock, for masturbation, for nagging; c12K were confirmed executed. Some estimates are much higher. Innocent 8 had one of his sons marry one of his former mistresses. He left several children and named Giovanni de Medici as a cardinal at 13.
1486 Humanism: Giovanni Pico della Mirandola (1463-1494), spoke 22 languages. An important Humanist of the Renaissance, at 24, he wrote Oration on The Dignity of Man as a preface to 900 theses, which he publicly offered to defend. He wrote, "Man is the spiritual center of the universe." He imagined God saying to Man, "We have set thee at the world’s center that thee mayest more easily observe whatever is in the world...so that thee may fashion thyself in whatever shape thou shalt prefer." Innocent 8 prohibited the reading of the 900 theses. The Vatican said 13 were heresies, so he imprisoned Pico. Pico recanted. He was absolved of heresy in 1492. He died two years later at 31.

Heresy

C1490-1519 Science: Leonardo da Vinci (1452-1519), the natural son of a Florentine notary, probably the greatest genius of the Renaissance, painter, sculptor, architect, engineer, scientist, pantheist (but hid this belief). He was responsible for the renaissance in science. In 1490, da Vinci observed capillary action of liquids in small bore tubes. In 1492, he designed a flying machine. Only 17 of his paintings survive, including the Mona Lisa (1506) and the Last Supper (1498), but thousands of annotated sketches of geology, botany, mechanical devices, medical devices, anatomy, military devices, architecture, and animals survived. He designed a horizontal water turbine.

He invented the camera obscura, said the moon reflects sunlight, it does not generate light. He discovered that being at rest was not the supreme principle of the world (as Aristotle had thought); restlessness and force were. Unfortunately for scientists and knowledge, his sketches and notes were not published for centuries.

He said that he knew how to see things. 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...Nature never breaks its own laws." Also, "All our knowledge has its origin in our perceptions." and "Whoever in discussion adduces authority uses not intellect but memory." He was the first to note the true nature of fossils. He barely mentioned the Christian God in his writings, and his only vision of God was pantheistic. Thirty years before Francis Bacon, Da Vinci saw the advantages of Induction and wrote about It.

1492 Martin Behaim, Nuremberg geographer, constructed the first globe of the world. It did not portray the Americas.

1492 Christianity: Ferdinand & Isabella conquered Moorish Granada, Islam’s last foothold in Iberia. Granada surrendered under a promise of civil & religious liberty. Torquemada, then ordered all Spanish Jews to leave Spain or convert to Christianity in four months. He used unspeakable torture on Jews & Muslims whose forced conversions to Christianity he thought insincere. Pedro Arbus, a Spanish inquisitor said, "Innocent or not, let the Jew be fried."

1492 A new world: Geneoan Cristobal Colon / Christopher Columbus (1451-1506), like most educated people, believed the Earth was a sphere. Given 3 small ships by Ferdinand & Isabella & helped by the Pinzons, a seafaring family of Palos, he sailed west from Palos bound for Asia. His flagship Santa Maria at 60-70 ft, had a deck. The others were caravels (hulls shaped like Arab dhow), one lateen-rigged. One Pinzon brother was his first mate. Two others captained the other ships. Santa Maria had about 40 crew. He was an experienced sailor. He possibly had been to Iceland. He had survived a shipwreck off Lagos, Portugal. The prevailing currents & winds of the N. Atlantic, which he discovered, are roughly clockwise, west from the Canaries to America, up the Gulf Stream, & East to N. Europe.

Columbus had a magnetic compass. He had vastly underestimated the distance to China, based on an incorrect small Earth diameter from the holy Second Book of Esdras which was copied by the Greek Posidienius & Florentine map maker Paolo Toscanelli, who had told Columbus of the gold, silver, & spices to be found by sailing west.

After 70 days, he landed, probably on the Bahamas islet of Samana Cay. Columbus called the inhabitants "Indians," thinking he had gotten to the East Indies (or possibly derived from Los ninos in Dio (The children in God, used by Columbus's priest). His flagship Santa Maria wrecked on Christmas eve 1492. He returned to Spain with gold, two natives, cotton, some animals & birds. He sailed again in 1493 with 17 ships & 1500 men. He made 4 trips to the New World, seeing Cuba, Puerto Rico, Bahamas, Jamaica, S. America. Until he died, he thought that he had reached the East Indies. Against Isabella’s wishes, Columbus enslaved all the natives he encountered. As agreed, he was made Admiral of the Seas and governor of lands he found. To Europeans, he found a new world. To native Amerindians, Europeans were simply invaders / killers.

Slaves in the Vatican

Slavery: Ferdinand sent 100 African slaves to Innocent 8, who kept some & gave some to cardinals & papal officials. (Despite the Bible, a few popes condemned some slavery, i.e., in 1435, Eugene 4 condemned slavery in the Canary Islands. Paul 3 in 1542 banned slavery of Amerindians who converted, but OK'd slavery in Rome. Urban 8 in 1639 prohibited enslaving South American natives who joined missionary communities. Benedict 14 in 1741 condemned enslaving Brazilian natives, but slavery of Africans remained sanctioned by the Church & used by kings/princes)

1493 Rodrigo Borgia / Pope Alexander 6, had been made a bishop, then a cardinal, by his uncle, Calixtus 3. He bribed a majority of the cardinals to make him pope. He had several children, appointed his 18 year old son, Cesare Borgia, as a cardinal (also appointed a nephew & the brother of one of his mistresses as cardinals). At 57, took a 15 year old mistress. He urged Cesare to create a state out of the Papal States in Italy. Alexander 6 gave away many of the Church’s estates to his children. Sicily expelled its Jews; as did Portugal in 1497, stole their properties.

1497-99 Dom Vasco da Gama (1462-1524), not believing Columbus had reached India, sailed around the Cape of Good Hope to Zanzibar and then with an Arab pilot, to Calicut, India, a trip twice as long as Columbus's, destroying the monopoly of Venice and the Muslims in Eastern trade. 3/5 of his men died of scurvy. By 1500, 700 kilos of gold and 10,000 slaves arrived yearly in Lisbon from W. Africa. By capturing Malacca in 1511 (dominating the Strait of Malacca) and the Spice Islands / the Moluccas in 1512, the Portuguese soon dominated the Asia spice trade, displacing Muslims.

Vasco da Gama

1499 Giovanni Caboto/ John Cabot, Venetian, and his son, Sebastian, sailed for Henry 7 of England to find a north route to India, found Labrador, Cape Breton, & the St. Lawrence river. First Europeans since Vikings to reach N. America.

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. Successor gurus through 1708 modified Sikhism's dogma.

Printing

Printing: Before 1500, most texts were printed in Greek or Latin. By 1500, books were being printed throughout Europe; 80 printing presses had printed 40,000 works; 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.

Printing spread news and knowledge everywhere. It helped move Man away from respect for authority to respect for common empirical facts. Printing helped destroy the oral society. It took from universities and monasteries their monopoly on learning and gave it to the middle class, a huge shift in power. Local language scripts and spellings became standardized. “How to...” books were the most numerous. Euclid’s Geometry was printed in Italian. The craft of making eyeglasses (heretofore rare and expensive) was born.

1500 Background: Before 1500, civilization was land-centered. Land travel was rare & at walking speed. Slavery was widespread, especially in Italy.. Classical Latin (not Medieval Latin) became the language of Western diplomacy & scholarship. The Church reigned supreme in Europe, closely allied with the kings & princes. Its corruption was beyond imagination. Every action by the clergy required a bribe or payment. It levied taxes, recorded births, marriages, deaths, baptisms, monopolized scholarship, controlled estates & the courts, ruled the Papal States. It was immensely wealthy. But, theocratic rule had failed. In the 1,000 years of theocratic rule, the population of Europe had less than doubled. Peasants were little better off in 1500 than in 500.

Renaissance ideas were weakening the theocratic state. Printing was destroying the Church’s monopoly of communication. The Church’s maps did not show the New World, an embarrassment.

1500 The West, divided into c300+ kingdoms / dukedoms / states / principalities / bishoprics / cities, was still only one, and not the greatest, of civilizations. Muslims ruled far larger areas. Japan, China, Aztecs, Incas, and Hindu Indians flourished. China (100M people, more than all of Europe) under the Ming Dynasty (1368-1644), was the most powerful and advanced nation, had its own inquisition, condemned 10,231 books. But the West, from the depths of the Dark Ages, open to innovation and eager to seize power, emerged as the dominant civilization with Christianity as its heart. By 1500, it equaled the other great civilizations.

The Rise of the West is the key to world history from 1500. Europe began to out-gun, out-invent, out-think, out-sail, out-produce, out-trade & dominate all other civilizations. How? Several factors. 1.All scholars spoke the same language, Latin. 2.The West was less inhibited by its own past. It adopted freely from the classical, Muslim & Byzantine. 3. Popular participation in economic, cultural, & political life was far greater in W. Europe than in the other civilizations. 4.Westerners were tough. 5.The West had the best military technology, including breech loading rifles. 6. They were inured to a variety of diseases. 7. The West’s disunity / diversity & internal warfare & competition gave birth to innovation & technological development. 8. The rise of scientific inquiry. 9. The West had new measuring devices. 10. The exploration & exploitation of the Americas (fueled largely by a hunt for gold & silver). 11. A favorable climate. 12. One scholar has credited the decimation of the trading cities to the East, Cairo, Baghdad, Samarkand, Calicut, Malacca, & Hormuz, from the great plague. 13. Another posited that Islam & China disdained independent thought. 14. the rediscovery of Justinian law meant a new science of law which led to shared knowledge which led to more universities.

Knowledge Explosion

The second knowledge explosion in human history began in Europe, continues today. The Scholastic philosophers of the 13th & 14th centuries, based their work on Aristotle, used Deduction. This method, however, did not advance science much. However, using Induction, advocated by Roger Bacon (c1267) & others, there was great progress in natural philosophies (partly based on Greek ideas that were dormant from c500 to c1500). America was being discovered and Russians was going East conquering Siberia. The world was Europeanized, with trade with the East.

From 1500 to 1800, the world’s population doubled from c400 million to c800 million, mainly due to improvements in farming. (The world’s population at AD 1 had been c300 million (including c100 million in Europe & Russia, i.e., the West). By 1500, it had increased only to c400 million, an infinitesimally small rate of growth).
Christianity: For 1,000 years, Western men had trusted the priests to achieve salvation; but now they learned that the Greeks & the Romans did no such thing. The Church weakened. In concordats with Austria (1448), France (1516), & Spain (1526), the pope was forced to concede far-reaching rights over the national churches. Martin Luther publicly challenged the Vatican. King Vasa of Sweden & Henry 8 took over the Church in their countries.

Townsd and a mercantile class grew. Literacy increased slowly in towns. Towns administered the granaries, set all retail prices, acted as banker, sold annuities on lives and inheritances. Europe became immensely 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.

Dogma vs. reason: Alexander 6 banned printing any book in Germany without the Church’s permission & ordered burning all books questioning the Church’s authority. Printing went to countries not under his control, like Holland.

1502 Torquemada gave unbaptized Muslims two months to leave Castile and Leon.

1502 Cartography: Americus/Amerigo Vespucci, Italian merchant, explorer, after his 2nd voyage to the new world in 1502, realized it was not the East & Marco Polo had described. He was the first to say the Americas were not Asia. In 1507, map maker Martin Waldseemuller published a map with the new world apart from Asia and named it America.

1509 Dogma vs. reason: HR Emperor Maximilian authorized Johannes Pfefferkorn to burn all copies of the Talmud.

Erasmus

Social criticism: In the West, Christianity permeated every thought & moment of people’s lives. Desiderius Erasmus (1466-1536), born in Rotterdam, the most famous & influential humanist, natural son of a priest, educated by the Brethren of the Common Life, who cared little for personal possessions, became a priest & eventually a monk. He taught Greek at Cambridge for two years where he became a friend of Thomas More (1516). He never returned to Holland. Against Church rules, he read Plato & other Greek writers. He spoke Greek as well as Latin (All clergy spoke at least some Latin). He ridiculed all sham, war, self-love, lawyers, the pride of kings, love of material goods, the servility of courtiers, national pride, neglectful high clergy, marriage, ignorant religious orders.

He sought to uncover the pure & simple elements of the Church that had been obscured by the excessive rationalism of Scholastic doctrine & the corruption in the Church. What Erasmus saw in Rome & in monasteries led him to write The Praise of Folly (1511) in seven days, & in Latin, so common people couldn’t read it. It ridiculed “brainsick foolish monks.” They have little religion in them yet are “highly in love with themselves & 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 & how long their girdles...They are pompous foolish clergy for their petty obsession with such matters as pardons & indulgences & trivial calculations of a soul’s exact duration in Purgatory & emphasis on irrelevant minutiae of dress & discipline...They calculate the time to be spent in Purgatory down to the year, month, day & hour.”

“Those 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.[& more examples]. Things like that are so foolish that I am almost ashamed of them myself; yet they are accepted not only by the laity but by professors of theology.” He showed the clergy as unnecessary & childish. His ideas dominated intellectual Europe for a generation. He doubted the authenticity all scriptures.

Despite his criticism, Erasmus stayed a Christian. His complaint was that the whole point of Christianity had been lost. He was relentless in his ridicule. Praise is considered one of the most influential books in to the literate community of Western Civilization and one of the prime catalysts of the Reformation. Only the Bible outsold it in the 16th century. He was the first Man to take full advantage of the printing press. Praise inspired other satiric attacks on corrupt & ignorant clergy. He considered his life’s work to reconcile Christianity with the classics. Erasmus published Aristotle’s works.

“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.. War is delightful to those who had no experience of it...I am conquered by truth ...Where there’s life, there’s hope...The worst peace is better than the most just war...[Speaking to the Church] By identifying the new learning [humanism] with heresy, you make orthodoxy synonymous with ignorance.”

1512 The Arts: Michelangelo Buonarriti (1475-1564), Florentine, sculptor, painter, architect, poet, a towering figure of the Renaissance, after 5 years, finished painting the Sistine Chapel. His paintings expressed the new humanism of the time. His art influenced European art. Italian literature declined after the deaths of Dante, Petrarch, & Boccaccio.

1512-17 Dogma vs. reason: The Church fought the new thinking. Pope Leo 10/Lorenzo de Medici (1475-1521), who had been made a cardinal at 13 & pope at 38, son of Lorenzo the Magnificent, ruler of Florence, condemned any teaching that the soul was mortal. The Fifth Lateran Council declared, inter alia, that no one could print a book without the local bishop’s permission. Adherents of Averroism were declared heretics.
By 1514, printer and scholar
The selling of indulgences so corruptly was the last straw for peasants.

Aristotle
Corruption, Heresy
Heresy
Heresy
Heresy
Scholasticism ridiculed: Humanist Johann Reuchlin (1455-1522) printed Letters of Famous Men which ridiculed the 1509 burning of the Torahs. To further the ridicule, Letters of Obscure Men, a purported collection of letters by ignorant clergy to Otruin Gratius/Gratz, a Dominican who epitomized the bigotry and pedantry of scholasticism also ridiculed and severely discredited scholastic pedantry. Leo 10 excommunicated the authors, who were anonymous.

Piri Reis, Ottoman admiral and map maker, drew the most accurate map of the world on a gazelle skin, the first known to include Antarctica. It depicted Africa, the N.E. coast of S. America and Caribbean islands, but little of N. America.

Astronomy: The Julian calendar was seen to be out of sync with the seasons. [It was out of sync by about 10 days.]

Pope Leo 10's secretary asked Nicolaus Copernicus / Pomnik Mikolaja Kopernika (1473-1543), a well educated Polish priest & mathematician who had studied law, medicine, and astronomy, with a doctorate in canon law, to resolve the problem of the calendar. Copernicus declined, saying he couldn’t explain why the calendar was out of sync with the seasons until the relationship between the Sun, Moon, and Earth was better understood.

Copernicus wrote a 40 page Commentarioius, suggesting a sun-centered system better explained certain observed anomalies among the observable skies. He wrote that there is no one center of all the celestial circles or spheres. The Earth is not the center of the universe,...All the spheres revolve around the Sun, and the Sun is close to the center of the universe. It was not printed but copies were circulated to his colleagues and other astronomers. He continued his astronomical studies, reading Aristarchus (270 BC), Nicolas of Oresme, possibly Philolaus (540 BC), Seleucus (146 BC), Aryabhata (499), and Biruni (1000). He had no telescope.

By 1514, printer and scholar Aldus Manutius, in Venice, had printed in Latin, the complete works of Plato, Aristotle, Pindar, Herodotus, Sophocles, Aristophanes, Xenophanes, Demosthenes, Dante, and Petrarch.

Scholasticism ridiculed: Humanist Johann Reuchlin (1455-1522) printed Letters of Famous Men which ridiculed the 1509 burning of the Torahs. To further the ridicule, Letters of Obscure Men, a purported collection of letters by ignorant clergy to Otruin Gratius/Gratz, a Dominican who epitomized the bigotry and pedantry of scholasticism also ridiculed and severely discredited scholastic pedantry. Leo 10 excommunicated the authors, who were anonymous.

Dogma vs. reason: Pietro Pomponazzi (1462-1524) described the spirit of the Renaissance in On the Immortality of the Soul. He said as Aristotelianism could not prove the existence of the soul, an ethical system based on rewards & punishments after death was meaningless. He rejected the idea that people needed the threat of Hell to act morally. Demons & angels don’t exist. So, devise a system related to this life. “The reward of virtue is virtue itself.” Aristotle, as interpreted by Aquinas, had become Christian dogma. So any attack on Aristotle was heresy. He said that Aquinas misread Aristotle’s theory of the active & passive intellect. He held the chair of Natural Philosophy at Padua. The Church burned his book. All Pomponazzi’s books treated the soul as mortal, contrary to Leo 10’s condemnation.

Sir Thomas More (1477-1535) lawyer, statesman, Speaker of the House of Commons, Privy Counselor, Lord Chancellor (thus the second greatest man in England.), good friend of Erasmus, sought radical reform in society and more rational dogma. He wrote Utopia, his greatest work, in 1516, describing an ideal community where everything is done in the best possible way, with communal owner ship of land, all houses the same, slaves did the hard work. He coined the word communism, favored educating men and women, and religious tolerance.

More revered and educated his daughters, inspiring others to do the same. On the other hand, as Chancellor he caused the torture of heretics and the persecution of persons owning a bible in English. Catholics and Anglicans have both declared More a saint. London followed Florence as a leading bourgeois city. Theaters were built.

Christianity: The Clergy was arrogant, corrupt, greedy, and incompetent, but powerful as the only game in Europe. It and had a monopoly on salvation. Church offices were bought and sold. Priests married and had mistresses. Monks carried relics around & charged a fee to touch them (12 monks’ orders had Jesus’ foreskin). Pope Leo 10 was forced to let French King Francis 1 appoint bishops and abbots. Bishops sold indulgences until the pope prohibited it and took over the business himself. He then appointed agencies, principally among the mendicant orders to sell indulgences.

Leo 10 (ref. 1513), sold indulgences widely to pay for a new St. Peter’s basilica. Leo appointed the Dominicans to sell indulgences for German speaking areas. Johann Tetzel, a Dominican monk, sold indulgences even for dead relatives presumably in Purgatory, with a schedule listing different prices for different sins.

Protestant Revolt. Martin Luther: (1483-1546) The selling of indulgences so corruptly was the last straw for Martin Luther, an Augustinian monk (not a Dominican) and professor of theology at the University of Wittenberg. He had read Erasmus and other Christian humanists. Repelled by the corruption in the Church, particularly by Tetzel, he printed and sent to his archbishop his Disputation on the Power and Efficacy of Indulgences (in Latin), later known as his 95 Theses, and reputedly nailed a copy to the door of All Saints Church in Wittenberg. Thesis 27 said, “There is no Divine authority for preaching that the soul flies out of Purgatory as the money clinks in the till,” a sales pitch Tetzel used. (The Hebrew Bible did list many payments & sacrifices to atone for various sins.)

Luther took the Bible literally. He rejected allegorical interpretations. Said, “The ungodly papists prefer the authority of the Church far above God’s word.” He said Man could be saved by faith in Jesus alone rather than the Church’s teaching that Man could be saved by faith and good works. Men did 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 Rome regarding Purgatory, devotion to Mary, most of the sacraments, priestly celibacy, & papal rule.
Luther resisted the Renaissance. "The aggregation of large libraries tends to divert men's thoughts from the one great book, the sole source of authority, the Bible, which ought, day and night, to be in every one's hand." "Universities only ought to turn out men who are experts in the Holy Scriptures." Ritual was secondary. He also said that Aristotle was "truly a devil, a horrid calumniator, a wicked sycophant, a goat, a prince of darkness, a beast, professed liar."

Luther removed the need for sacraments and priests. He spread his views through pamphlets and public debates, in German, not Latin. His criticisms were distributed throughout Europe. "Print is the best of God's inventions," he said.

1517 Luther said, "The [Catholic] 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 be able to read the Bible, so he supported free education for all German youth. He created a Bible in German.

Some must be free; some serfs 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 he disagreed with Luther's dogma and his derogation of human reason. Later, Erasmus opposed Luther and tried to reform the Church from within.

Luther said each Man can read the Bible as he wants. Many did, founding many different Protestant sects. Various factors helped the spread of the Protestant Revolt, including a rising sense of nationalism, the invention of printing, the rise of humanism, the intellectual barrenness of scholastic theology, & the corruption & low intellect of priests. But most importantly, it flourished as it enabled German ruling princes to escape the Church's taxes. Luther's movement broke the unity of Christendom. The Church was now one state in Europe, not the supreme ruler of all states.

1519- Geography: Portuguese Fernao de Magalhaes (1480-1521) was sent by Spain to determine if the world was actually round. He sailed west & south from Seville, & around South America through the Straits of Magellan westward. He named the Pacific Ocean as it was so peaceful. He was killed in the Philippines, but one of his five ships, laden with spices (and 18 of the 270 men who started the trip) completed the trip in 1522. Some Christians still thought that the Earth was flat. This route to the East was too long to be commercially viable.

1519+ The Americas: In the New World, there were no large animals suitable to pull plows or wheeled carts. (Llamas & alpacas in the Andes could carry some goods but weren't strong enough to ride or pull carts or plows.)

America Amerindians were thus limited to planting seeds with a pointed stick. The most advanced Amerindian cultures, Mayan (defunct by c950), the Incas (Peru), or Aztecs (Mexico), were not as advanced technologically as Sumerians of 4,500 years prior. They had no potter's wheel, no plow, no wheeled carts, no metallurgy, no merchant class. They did have gods, ethical codes, creation myths, good calendars, and medicines from plants.

The Aztecs and Incas were unaware of each other. Aztecs were unaware of the Incan potato, the Peruvian staple. Conquistadores seeking gold, & missionaries flooded America. For 300 years, far more slaves went to the Americas than white Europeans. Dominicans led the criticism of slavery in the Americas, but also named the Inquisitions.

Mexico Aztecs The Aztec empire, ruled by Montezuma, had c19M people, 5M under his direct control. Mexico City had c200K people, had built huge pyramids, used irrigation, crop diversification, primitive pictographs, developed a highly accurate calendar, used positional notation. The Aztecs believed that they were the Chosen People. The scope of their human sacrifice was staggering. Estimates vary, but 20,000 per year is plausible. The Incas & Aztecs ruled by fear & force.

1520 Europeans brought Eurasian measles, cholera, influenza, plague, TB, and typhus, which killed the natives, especially in the Mississippi River System, far more than the murderous conquistadores. Hispaniola's Indian population of perhaps 100,000 was 300 by 1535. Hernan Cortes landed in Mexico with 668 men. In 1520, he captured Montezuma and began to loot the Aztec riches. The Aztecs rose up and drove his men out. But then, smallpox brought by a Spanish slave belonging to Cortes, within six months killed from 1/4 to half of Mexicans. Cortes then destroyed weakened the Aztec empire in one year. Mexico was named New Spain.

America was a huge shock to the European and Christian psyche. (It wasn'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 painfully slow in being recognized.

By 1520, Luther's various writings numbered over 300,000 copies. In 1520 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." He was excommunicated. In 1521, he had to appear before HR Emperor Charles 5's Diet of Worms. There he reputedly said, "Hier stehe Ich. Ich kann nicht anders." (Here I stand. I can not otherwise). The Diet put him under the ban of the empire, his works to be burned, and for him to be arrested. He hid in the castle of Prince Wartburg.

His Protestant Revolt 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. Like Muhammad, Luther at first only wanted to bring his Church back to its original holy pure roots away from the corrupt business it had turned
into. But the Vatican’s hostile reaction caused him to feel he had to oppose it. In 1522, 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.” The Church called him a bastard, an atheist, a drunk, and a blasphemer.

He said, “If Jan Hus was a heretic, then there is not a single Christian under the Sun.” Inter alia, Luther said 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, tame animals have white flesh,” and, We know from Moses that the Earth is just 6,000 years old. Luther said, “I would have no compassion for a witch. I would burn them all.” Luther also said that all sicknesses were caused by Satan, who poisons the air.

Luther repeated Jesus’ 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.” (Believers can easily verify this promise by praying for something good.) In his German translation of this passage in 1522, Luther inserted the word “alone” after the word “faith,” saying, “It’s my translation.” (There is some Biblical support for Luther’s position, Ephesians 2:8-9.)

1524
Luther considered women inferior. He said, “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. “Men are more understanding than women. “I cannot forbid a person to marry several wives, for it does not contradict scriptures.”

Like Dante, Wycliffe, Huss, and the Waldensians, Luther said civil authority was derived directly from God, without papal intercession. He cited Ockham in his denunciation of the papacy, and said the clerical hierarchy and canon law were unChristian and worldly. For all its importance to Western Christianity, Protestantism did not spread beyond Western Europe. Eastern Orthodox Christianity ruled from Constantinople ignored it.

Ulrich Zwingli, Swiss priest, inspired by Erasmus, organized Protestant cantons against Catholic cantons

1524-25
Luther changed his dogma in ways that accommodated his political patrons. When the Protestant princes were in conflict with HRE Emperor Charles 5, than living in Spain, Luther said that newly Protestant German princes had the right to resist the emperor, & that the authority of a ruler should be respected only so long as he was just & untyrannical. But, when the peasants revolted against the his princes in 1524, Luther abandoned the peasants, 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 in doing so. If the peasants are in open rebellion, then they are outside the law of God.”

Many clerics’ religious views are comfortably consistent with their patrons’ political and economic interests.

Anabaptists: Similarly, when he 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”). But, when soon confronted with the rise of the Anabaptists (Baptized Again) and other more iconoclastic sects seeking a purer Christianity, he asserted that the state should tolerate only certain sects and persecute others. Anabaptists wanted simple Christian living, believed that the true Christian should not participate in or be governed by the secular state.

They considered all believers equal. Anabaptists said that the Last Supper was a meal of fellowship according to Jesus’ example. So, Anabaptists were viciously persecuted and killed by both Roman Christians and Protestants. The Protestant Revolt grew along with the Renaissance in Northern Europe.

Religion: The Church became the Roman Catholic (Universal) Church. The Vatican reaction to Luther was stupid, self-defeating. It viciously attacked all Protestant dissent and continued its corrupt ways. The archbishop of Toledo, scholar Carranza, an admirer of Erasmus, was imprisoned for 17 years before his acquittal of heresy.

Erasmus’s On Free Will.1524, lampooned the Lutheran view on free will. He argued that human effort cooperates in the process of sanctification. He did not encourage any definite action. In response, Luther wrote his De servo arbitrio (On the Bondage of the Will) (1525), which attacked Erasmus himself, going so far as to claim that Erasmus was not a Christian.

Luther preached the complete sovereignty of God. Unredeemed humans are dominated by Satan, unless overpowered by a stronger power, God. Informing on a “heretic” earned the informant a third of the heretic’s estate. Among Protestant leaders, only Ulrich Zwingli / Ulricus Zuenglius (1484-1536), Swiss, openly repudiated the doctrine of Original Sin. He said that one cannot sin until one is aware of the sin, standard Catholic dogma, and the doctrine that only through the Church one may avoid Hell. Luther rejoiced when he died. Other Protestant sects accepted Original Sin, even for infants. Luther’s movement came to be called Lutheranism.

Humanism strengthened. As princes diminished the pope’s political power, humanism challenged the religious dogmas of the Christian churches, Humanism gave Man pride of place in the world due to their power to reason.

William Tyndale, a priest, published an English translation of the New Testament. But the Church did not want wide readership of the Bible. It wanted its clergy to be its interpreters. He found a printer in Worms. Henry 8 had him killed.
1527  **King Gustav Vasa** of Sweden and Finland took control of the Church there, all its property, and appointments, and decreed that the “pure word of God” was to be taught in all schools, effectively sanctioning Lutheranism.

Medicine had stultified. An iconoclastic doctor, Paracelsus, in Basel, threw a medical text of Avicenna into a bonfire. He sparked new interest in better methods of cure. A printer whom he had cured spread his fame. Before him, a disease was thought to be an unbalance of one of the four bodily fluids. Paracelsus said each disease was determined by a specific agent outside the body and had a specific locus in the body. He sought chemicals to cure each disease.

1525-1700  **Wars between Catholics and Protestants, fed by the mutual intolerance of Luther and the Church, engulfed Europe.**

The Church revived its Inquisition. Distain 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 round to even small parish churches destroying all images, everything of beauty. Calvinism, a very severe sect, grew strong in nominally Catholic France. Caliph Suleiman besieged Vienna, unsuccessfully.

1532  The Incas, in Cuzco, ruled an empire stretching from Quito to Santiago. Incas were the ruling family only, perhaps a dozen people. In the 1400s, the Incas had built, and abandoned Machu Picchu, with exquisite stonework. The Incas also sacrificed humans, but far fewer than the Aztecs. In the 1500s, the Inca Sun god, had its own full time priesthood. Inca emperors, to show their divine connection with the Sun, wore suits of polished metal to reflect the Sun’s rays. Thunder, lightning, the moon, stars, were also worshiped. Everywhere, herds and fields were reserved for the gods. They attributed a magical significance to numerous natural features of their surroundings, such as a cave or a spring. The Inca’s writing, called khipu, was varying length strings with varying types of knots, tied to a larger string. It has not been deciphered. A smallpox epidemic had spread from Spaniards in 1526 and killed the Inca emperor and most of his court.

**Pizarro betrayed Inca king, looted Peru**

In 1532-34, Francisco Pizarro (c1470-1542) and 168 men (62 on horseback, magic to the Incas) captured the new Inca emperor Atahuallpa, got vast amounts of gold as ransom & then killed him. The Inca empire, based so completely on its emperor, then largely disintegrated in three years. Incas had bronze knives. Atahuallpa had never learned of the Spanish conquest of Panama, just 600 miles north. The Spanish never learned of the abandoned Machu Picchu.

Under Spanish rule, in 50 years, Peru fell from c12M people to c500K, from diseases of the Spaniards & from being worked to death as slaves in silver mines. Peruvian silver mines supplied Europe most of its bullion for 300 years.

**Political Theory, Niccolo Machiavelli** (1469-1527): The many small Italian states practiced diplomacy continuously. Machiavelli was a Florentine diplomat, out of favor, out of office. He had written The Prince / El Principe, privately printed in 1513 when he was seeking to regain political office. He dedicated it to Lorenzo the Magnificent, ruler of Florence. In Italian, it was the first purely secular study of political theory in the West. It was a manual for how a prince should govern. It cynically described how to govern the people, principally through deceit. Machiavelli saw Christianity’s role in politics as a disaster that destroys the power of the state to govern. He rejected that popes were superior to kings. It was published in 1532 five years after his death.

**Machiavelli quotes**

His advice to a prince, “As love & fear can hardly exist together, if we must choose between them, it is far safer to be feared than loved. If one must be cruel, be cruel quickly, and cause great injuries, for small injuries do not keep a man from revenge...Be cunning as a fox & as fierce as a lion...Princes should leave things of injustice and envy to the ministry & execution of others, but acts of favor & grace are to be performed by themselves.

“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 refrain from taking property, for men forget the death of a father more quickly than the loss of the land inherited from their father.”

1532  “The prince must cultivate the appearance of mildness, sincerity, and religiousness, but ignore such traits when necessary. A prince should use violence, cruelty, perjury, and hypocrisy whenever political exigencies required it.

Any act to gain or retain power was permissible. Religion and patriotism were simply tools to be used to stay in power. Imperialism, the expansion of the state, is the basic trait of the state. As men are stupid, deceit is easy, and the crafty man will always win.”

“Prudent rulers pay homage to popular superstitions...There is nothing more necessary to appear than to appear religious.”  “There never was any remarkable lawgiver who did not resort to divine authority.”  He also argued that only under conditions of relative economic equality could a republic endure. Otherwise corruption or revolution would result. The Prince was later put on the Index of Prohibited Writings (which began in 1559).

Some ancient writers had described the concept of rulers using religion to maintain their rule. For example: Hammurabi and Moses both said they received their civil laws from a god., Diodorus Siculus c55 BC: “The myths about Hades & the gods, though they are pure invention, help to make men virtuous.” Polybius, 125 BC The masses...must be filled with fear to keep them in order. The ancient did well...to invent gods. Marcus Varro, 40 BC, Roman polymath. It is for the good of the state that Man should be deluded by religion. Aristotle c335 BC, Cicero 65 BC, Seneca the Younger AD 40, and al-Razi c910 all expressed similar thoughts.
1532  *The Prince* detailed truthfully what ruling classes had practiced for millennia but had not publicly admitted, i.e., the
cynical use of religion / superstition / patriotism to control the lower classes. Francis Bacon, in *Advancement of
Learning* 1605: “We are much beholden to Machiavel & others that write what men do, not what they ought to do.”
Averroës opposed al-Ghazali’s revealing doubts about the divinity to the lower classes.

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

**Force, Fraud, and Favors.** A country, tribe, or group is first defeated militarily and the victors rule by force and fear. Eventually force becomes impractical, too expensive. So the conquerors rule by fraud, that is, superstition, religion, the promise of
Heaven and the threat of Hell (carrot and stick), appeals to patriotism (Recall, the Romans made conquered
peoples “citizens”), and the caste system, all techniques designed to keep the vanquished docile and productive.

Fraud

After Machiavelli, the concept of the ruling class cynically using religion, which they personally considered nonsense
to control the governed classes, became a common theme in Western thought and literature. For example:

Maimonides: “People need religion for political & emotional reasons. For ideas, our best options are reason, meditation”

Edward Gibbon: “The various modes of worship which prevailed in the Roman world were all considered by the
people as equally true; by the philosophers as equally false; and by the magistrate as equally useful…”

When Caesar subdued Gaul, [it] had 3 orders, the clergy, who ruled by superstition, the nobility, by arms, and the [people]

Napoleon: “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.” 1801 “How can you have order in a state without
religion?...When one man is dying of hunger near another who is [full], he cannot [accept it] unless there is
an authority which declares - God wills it.”

Napoleon also proposed using missionaries as spies.

Frederick the Great reputedly said, “Religion is a fraud, but it must be maintained for the masses.”

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.”

Thomas Hobbes, 1651, Religions were formed and sustained by people in power to control their subjects.

William Hazlitt, Brit, in *On the Clerical Collar* 1819, “The garb of religion is the best cloak for power.”

Robert Burton: Anglican, The fear of some divine power keeps men in obedience. One religion is as true as another.

Leo Tolstoy: Patriotism...for rulers is nothing else than a tool for achieving their power-hungry...goals; for the ruled
it means renouncing their dignity, reason, conscience, & slavish submission to those in power...patriotism is slavery

Edmund Burke, the father of modern conservatism, explained, “All governments must frequently infringe the rules of
justice to support themselves; truth must give way to dissimulation, honesty to convenience.”.

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....”

Robert Ingersoll, “In all ages hypocrites called priests have put crowns on the heads of thieves called kings.”

Clarence Darrow, “Rulers have ever taught and encouraged the spirit of 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.”

Paul Dirac, “Religion is a jumble of false assertions, no basis in reality...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.”

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.)

In addition to the above, Spinoza 1670, Burke 1790, Marx 1848, Dostoyevsky 1880, Aldous Huxley (Brave

Favors

Then, 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. (Compare to Weber 1904).

1533  England: King Henry 8 (1491-1547) wanted an annulment from Catherine of Aragon as she bore only a female heir,
Mary. Pope Clement 7 (a Medici) would not annul his marriage to Catherine. So in 1532, at his mistress Anne

Cranmer declared Henry’s marriage to Catherine void and Henry’s marriage to Boleyn valid. Thomas More,
the Catholic Lord Chancellor, would not accept Henry as supreme in religious matters, so he resigned. Henry had More killed. Henry never renounced the Roman Church, but he took its vast real estate, i.e., monasteries, and wealth. Henry married six times, and, while head of the Church in England, on false allegations, murdered both wife 5 Catherine Howard & Boleyn who gave him only a daughter, Elizabeth, who later came to rule England well for 45 years.

Roman Catholic Christianity was not popular in England as it had come with the Norman invasion. After Henry died, his son Edward 6, (from wife 3 Jane Seymour) ruled for six years and died at 15. Then his daughter Mary (by
Catherine 1), a Catholic, ruled. Mary burned at the stake over 300 Protestants, including Cranmer, earning the name Bloody Mary. Mary was succeeded by Elizabeth, Bolney's daughter, under whom the Church in England became Anglican, its dogma close to Catholicism. All told, Henry killed two wives, 20 peers, 4 leading public servants, 1 Lord chancellor, several heads of monasteries, and 6 close attendants & friends and 72,000+ other persons.

1536 Calvin: John Calvin (1509-1564) French theologian, a lawyer, first a Humanist, left the Catholic Church c1530 and founded a new Christian faith close to Lutheranism, but which believed in predestination. In 1536, at age 26, he published Institutes of Christian Religion, the first edition of an exposition of his religious philosophy. It is authoritative, systematic, & comprehensive. He revised & expanded it throughout his lifetime. Re the Problem of Evil, he said that 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 Man can't see it (Man is too dumb). One's function in life is to serve God.

Problem of Evil

Where Luther's writings had been emotional outpourings, Calvin set down a system of reasoned, logically formulated morals, policy, and dogma. The sum of human wisdom is in two parts, knowing God (only possible by studying scripture) and knowing oneself. Said, "It is hard to find one monastery in ten that is not rather a brothel than a sanctuary of chastity. What frugality is there in their food? They are like so many swine fattening in a sty."

After various problems, Calvin was invited to Geneva in 1541 to lead reforms in the Church, and, with the city council, established a theocratic government. Said Calvin, "The law of God, which we call the moral law, must alone be the scope, and rule, and end of all laws. He preached thrift, responsibility, sobriety (invite one for a drink, be fined three sous; be drunk, 3 sous; dance, be fined 3 sous and jailed). Like Luther, he took the Bible absolutely literally, kept only the sacraments of baptism and the Lord's Supper / Eucharist. He had a prominent Genevan member of the bourgeoisie burned as a "speculative atheist" and 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 sinned as God determined it. Calvinism became the Southern Baptist Church, & grew more widespread than Lutheranism. Despite some opposition, he ruled until his death. Calvin and Luther retained the cruel doctrine of Original Sin and all Protestant sects continued the persecution of "heretics."

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 office, etc. But, with the rise of Protestantism, supported by the rich middle class, who were more likely lenders than borrowers, usury was dropped as a sin, first by the Calvinists, then by other Protestant sects, and finally by the Catholics (in 1830), so usury became just charging excessive interest.

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. The Reformation rejected the Roman elements, softened the Greek elements, and strengthened the Judaic elements. Protestants rejected the Church as a vehicle of revelation; truth was to be sought directly from the Bible, which each Man could interpret for himself. When interpretations differed among Protestants, numerous sects emerged. There was no central authority to reconcile their differences.

1536 Astronomy: After hearing a favorable lecture on Copernicus's theory of heliocentrism, Nicolas Cardinal von Schoenberg asked Copernicus to make known his theory, then accepted by some scholars, & to send the cardinal all his information. Copernicus had virtually finished his de Revolutionibus orbium coelestium / On the Revolutions of the Celestial Spheres, a fuller exposition of heliocentrism & lectured on it, but was afraid to challenge the Church's Ptolemaic view by publishing it. He did not furnish the requested information. He continued work on his book.

1536 The Portuguese Inquisition, under its king, began, mainly targeted Sephardic Jews, burnt 1,175 victims by 1794.


c1536+ A Just War: Centered in the University of Salamanca, a group of Catholic theologians of natural law and of morality began to teach a school of thought originating with Francisco de Vitoria that expanded on Aquinas's concept of natural law and just war. They developed criteria for a just war. It ought to be resorted to only when necessary to avert a greater evil. First try diplomacy, then a war was just if 1. In self defense, as long as 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. 5. The people must support it. and 6. It must not harm innocents. This influenced Hugo Grotius 1625.

Problem of Evil

Vitoria criticized the Spanish king for his conquests in the Americas. He further 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 also developed modern economic theories. Regarding the Problem of Evil, Vitoria said the evil in the world was inevitable when God gave Man free will.
Eurasian diseases in America: Hernando de Soto, explored Florida and the American Southeast for gold. No gold. When he marched through the Southeast, he passed through Indian town sites, empty due to Eurasian diseases. Mexico may have lost 75% of its population and some Caribbean island peoples were wiped out entirely.

**Columbian Exchange**

Columbus’s journey caused the greatest addition to human knowledge ever made by one person & the largest population & crop replacement in recorded history, called the Columbian Exchange. The New World’s animals & plants shook up science immensely. Crops spread around the world, output increased. Potatoes, the most important food import to Europe, grows in cold climates & can support twice as many people per acre as any other crop.

Explorers brought hundreds of new species of plants & animals to America (wheat, sugar, horses, cows, sheep, goats), plus guns, insects, diseases, micro-organisms & vice versa. Thus there are tomatoes in Italy, hot peppers in Thailand, potatoes & corn in Europe, oranges in Florida, tobacco in Turkey, sugar & apples in the US, rice in Louisiana.

**Ignatius of Loyola** (1491-1556), 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 said, “I will believe white is black if the Church so defines it.” Jesuits became the most powerful force in the regeneration of the Church. Nonetheless the Church was losing authority, not to science but to Protestants, kings and princes. Science had a very small part in the Italian Renaissance, which looked to the Greeks, not to science.

**Pope Paul 3** banned slavery of Amerindians who converted, but OK’d slavery in Rome. The slave sellers in Africa were Blacks. Paul set up the Congregation of the Holy Office of the Inquisition to run & oversee local Inquisitions. He named one of his four children, Pier Farnese, as Duke of Parma & two grandsons, ages 14 & 16, as cardinals.

**Astronomy:** Copernicus published De revolutionibus orbium coelestium, as he was dying. Andreas Osiander, a Lutheran clergyman wrote an unsigned preface as if it were written by Copernicus presenting heliocentrism only as a hypothesis. This was the first great scientific work of the Renaissance. Without a telescope, he 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 observed and measured. Copernicus believed the Sun as the light giver was closer to perfection and God than 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 (as he knew it). He wrongly thought the planets’ orbits were circular. Heliocentrism contradicted the geocentrism of Aristotle, Ptolemy, and Christian dogma. Heliocentrism, most importantly, took the Earth from the center of the universe and undercut the Church’s claim of God’s focus on the Earth.

**Christian reaction to Copernicus**

Dogma vs reason: Citing Psalms, John Calvin said, “Who will venture to place the authority of Copernicus over that of the Holy Spirit?” Luther, “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.” In 1546, Dominican Giovanni Tolsani denounced heliocentrism in a work defending the absolute truth of Scripture. Possibly due to Osiander’s groveling preface and Copernicus’s difficult writing style, the Vatican did not immediately react to Revolutions. There was little popular reaction or reaction in “scientific” circles. This came big after Kepler and Galileo made it widely known in the 1600s.

**Luther hated Jews, Muslims, & Seneca**

Luther was a raving Anti-Semite. His book, On the Jews and Their Lies (1543), 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 to burn their 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 pervasive anti-Semitism. Hitler praised Luther in Mein Kampf, and quoted him in his speeches against Jews. Nazis cited Luther at the Nuremberg Trials to justify the Holocaust.

Re Muslims, Luther said, “The kingdom of Muhammed is a kingdom of revenge, of wrath, and desolation.” Luther also denigrated Seneca’s 1st 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.”

**Anatomy:** Andreas Vesalius (1514-1564), at Padua, published the 600 page Structure of the Human Body, based on his dissections of corpses, a complete, accurate description of the human anatomy, with precise illustrations. He taught that the only way to learn the human body was to dissect it. He corrected over 200 of Galen’s (AD 180) errors. This book and Copernicus’s Revolutionibus are considered to mark the beginning of modern science.

Science: Konrad von Gesner (1516-1565), Swiss, published Bibliotheca universalis, a catalog of 10,000 then extant titles, with 3,000 authors. Books were written about fish, birds, plants, and metals. His 4 volume Historia Animalium (1551-1558) 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). Math: In the 16th century, in the West, Arabic numerals finally replaced Roman numerals, greatly simplifying math.

Dogma vs reason: Printing: In France, the Inquisition closed down presses that printed Protestant texts. Many printers fled France. Etienne Dolet, a printer accused of printing heretical works & of being an atheist was strangled & burned.
1545-63 **Council of Trent**: The Reformation destroyed the HRE. Kings and princes claimed a divine right to govern without the blessing of the pope. The Church made some efforts to reform (known as the Counter-Reformation), but the 18 year Council of Trent / Trento (Italy), stacked with Italians and Spaniards, foolishly rejected all compromise with Protestants.

### Faith

It reaffirmed that faith alone was insufficient for salvation. It reaffirmed the seven sacraments. It did condemn the sale of Church offices, the sale of indulgences, and bishops’ corrupt pursuits. The number of parishes a priest could have was limited. 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.

The Council of Trent told the Jesuits to establish eight universities in German speaking areas and more in

### Jesuits

England, Italy, and France. Math, scripture, cosmology (but not heliocentrism), rhetoric, good manners, and geography were to be taught. By 1556, when **Ignatius** died, Jesuits operated 74 colleges on three continents, including humanist ideas. The Council condemned Erasmus as a heretic. Praise of Folly was later put on the Index.

Original Sin: Trent reaffirmed that infants who died unbaptized go to Hell, deemed celibacy and virginity superior to marriage, ordered seminars in every diocese. Art and architecture were 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.

1546 **Geography**: Gerhardus Mercator (1512-1594), a Flemish geographer, stated that the Earth had a magnetic pole. He was the first to use the name America for the new world. [In 1568, he devised a cylindrical projection for maps.]

1553 **Dogma vs. reason**: Miguel Serveto / Michael Servetus, Spanish theologian, physician, had discovered the pulmonary circulation of blood, but didn’t accept the Trinity. So the Spanish Inquisition condemned him. He escaped to Geneva. Calvin, the “Protestant pope,” ruler of Geneva, recommended beheading. The city council burned him at the stake.

1554 **Peace of Augsburg** treaty between Catholics and Lutheran princes legally accepted Lutheranism. Religious 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.

1555 **Anatomy**: Pierre Belon described the basic similarities of the bone structure of all vertebrates, from birds to fish to man.

Matteo Colombo, Italian surgeon, showed the circulation of blood from the heart to lungs and back

1559 **The Index: Thought as a sin**

Dogma vs. reason: Miguel Serveto / Michael Servetus, Spanish theologian, physician, had discovered the pulmonary circulation of blood, but didn’t accept the Trinity. So the Spanish Inquisition condemned him. He escaped to Geneva. Calvin, the “Protestant pope,” ruler of Geneva, recommended beheading. The city council burned him at the stake.

1560 **Sea trade**: In the century after Columbus, world sea trade expanded; spread the ideas of the Renaissance. Bulk trade in slaves, sugar, rum, cloth, as well as luxuries, took over the Atlantic & spurred Europe’s economy to change from agrarian to commercial. Spain & Portugal sailed to South & Central America. Dutch, English, & French sailed to North America. Slaves were needed for the Americas & Caribbean sugar & cotton plantations. Slaves in Europe were generally domestic servants, although sugar plantations in Cyprus & Crete had plantation slaves.

1565 Slavery in the Americas: St. Augustine, the first permanent European settlement in the US, was founded. It had slaves. Only 5% of the African slaves brought to the New World came to North America. Almost all went to the Caribbean, Brazil, or Spanish America. In the Caribbean, slaves’ infant mortality reached 75%.

Pope Pius 4 ordered all Jews out of his Papal States in three months. Popes subsidized religious art, not science.

1572 **Catholic-Protestant Wars**: French King Charles 9, Catholic, age 12, obeying his mother, Catherine de Medici, ordered the killing of about 100 Huguenots / Calvinists / Presbyterians, nobles who lived in apartments in the royal
palace as did Catholic noble families. Catherine sought to prevent the Reformation from gaining influence in France. Catholics throughout France took this as a sign to kill Protestants.

In 40 days, throughout France, Catholics slaughtered 500,000 non-Catholics. Pope Gregory 13 was so pleased that he commissioned 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 "St. Bartholomew's Day Massacre" was a crucial turning point in the relations between Catholics and Protestants. It caused Protestants throughout Europe to no longer view the Catholic Church as misguided but as a force of evil itself. Catholic and Protestant armies slaughtered each other as well as innocent non-combatants.

1572 Dogma vs. reason, astronomy: Danish king Frederick 2 gave Hven, an island in the Danish Sound to astronomer Tycho Brahe (1546-1601). Brahe there constructed large instruments to accurately measure the stars. He had no telescope. A geocentrist, he noticed a new star in the constellation of Cassiopeia. (It was a supernova, explosion of a star resulting from the collapse & rebound of a high mass star after nuclear fusion has depleted in its nuclear core). This contradicted the Church’s teaching of a changeless universe showed God’s immutable love for the world. In 1573, he wrote that Cassiopeia showed the universe did change. It made him famous, & to the Church, dangerous. Catholic theologians said he erred, blamed the Devil, said that above the Moon, the heavens did not change.

1576 Dogma vs. reason: Giordano Bruno (c1548-1600), a Dominican monk who had disobediently secretly read Erasmus, was accused of heresy for reading him. He accepted Copernicus’s theories. “There is in the universe neither center nor circumference.” Said the Scriptures were for moral guidance, not to teach about physical things He wrote treatise promoting an extreme form of pantheism (God is Nature). “Truth does not change because it, or is not, believed by a majority of the people.” In 1591, he wrote On the Infinite Universe and Worlds.

1577 Astronomy: Brahe (1572) noted that a comet (also 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 spheres. Brahe also corrected all existing astronomical records, which were inaccurate. His data provided the best proof for heliocentrism, but, ironically, he still thought the Sun circled the Earth. When a new Danish king was not supportive, Brahe concluded his life’s work in Prague with a German assistant, Johannes Kepler.

1577-80 Francis Drake, a successful English pirate, was the second to sail around the world, 60 years after Magellan’s men.

1579 Religion: Matthew Hamont, British, in Norwich, denied the divinity of Jesus. So Anglicans burned him at the stake.

1580 Humanism: Michel Eyguem de Montaigne (1533-1592), mayor of Bordeaux, a sceptic, said of the wars of religion, “In trying to make themselves angels, they transform themselves into beasts.” He wrote Essays, the first book to reveal frankly the author’s mind and heart, started a new genre of literature that has become most important of all in subsequent centuries, the essay. In studying himself, he studied mankind, said Man was not superior to beasts. He also wrote Of Wisdom in 1601. He ridiculed witch hunts. (Put on the Index in 1676)

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 and 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]... See and say yourself as you really are... Men of simple understanding, little inquisitive and little instructed, make good Christians.” Religion was simply something taught to children. His writings were put on the Index.

His The Defense of Raymond Seybold 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.” He cited Lucretius’s atheistic On the Nature of Things more than any other text. Cicero’s On the Nature of the Gods came in second.

1582 The Gregorian calendar based on Copernicus’s findings (leap years, etc.) replaced the Julian calendar.

1583-86 Physics, Galileo Galilei:(1564-1642), leading mathematical physicist of his time. Einstein called him “the father of modern physics—indeed of modern science altogether.” A contemporary of Francis Bacon and Descartes, Galileo saw that what was considered natural philosophy was a kind of abstract philosophizing. For example, Aristotle had said that objects rose or fell in order to reach their “proper place,” a moral judgment. Galileo measured their weights. In 1583, Galileo, age 19, discovered that the period of a pendulum was solely proportional to the square root of its length. (A one meter pendulum takes c2 seconds.) He realized this principle’s importance for physics experiments. In 1586, Galileo at 22, published an essay describing his invention of a hydrostatic balance, a precise scale.

1583-85 Simon Stevin (1548-1620), Flemish, discovered the hydrostatic principle, that pressure of liquid in a vessel depends only on the height of the liquid, a simple principle that modern water tank towers don’t use. In 1685, he introduced decimal fractions to the West (used in India since the 7th century). Stevin also invented a land yacht, a wagon with sails, and increased the efficiency of windmills pumping water by three times.
At 25, **Galileo** obtained the chair of math at the University of Pisa. During this period, he studied **Copernicus**. He ridiculed the Scholastics, students who dressed in togas, “like little wax Aristotle.” Scholastics ran Pisa.

**Abul Fazi’s Book of Akbar**, described **Sufism**’s basic idea, conciliation in all things, gentle relations between sexes.

**William Shakespeare** (1564-1616) world’s premier dramatist, possible pen name of several worthies, the first great secularist, the poet of middle class values, dissed religion, undermined the heroic, had no personal dogma or ethics, respected but not world-renowned until the1800s. He summarized human emotions in simple profound verse, told great stories, coined c1800 words. He turned a phrase: “Salad days...What a piece of work is Man...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. ..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.”

**Galileo** published **De Motu/On Motion**, which refuted **Aristotle**’s idea of two kinds of motion, forced and natural. He showed they were the same. He posited that a body in motion would continue in a straight line until something stopped it. **(Inertia, Ref, Mo-tzu, al-Haytham, Philoponus, Avicenna, Ockham, and Newton’s 1st Law of Motion)**

**Galileo** also described experiments showing that all objects, heavy or light, fell and accelerated at a constant and identical rate [c32 feet/sec/sec on Earth]. [**John Philoponus** (6th century), **Giovanni Benedetti**, Italian (1585), and Simon Stevin, Flemish (1586), had all said the same. **Aristotle** had said heavy objects fell faster.]

**Galileo** moved to the U. of Padua at the invitation of the elders of Venice. Padua was under the protection of Venice and not the harsh Vatican. **It tolerated no interference from the pope.** Venice expelled Jesuits for interfering with the university. **Galileo** there described problems in raising weights and showed that projectiles followed a parabolic path. (Aristotle had said projectiles follow two straight paths.) In1593, he invented a water pump, powered by horses. In 1596, he invented a primitive thermometer using the expansion of air to measure temperature. It was good but not great as it did not compensate for outside air pressure. (more Galileo, 1605, 1609-16, 1624, 1632+)

Sir **Francis Bacon** (1561-1626), lawyer, MP at 23, lord chancellor, not a scientist but one of the principal founders of modern science as an advocate of empiricism and of **Induction** to avoid the sterile Aristotelian scholasticism. He taught at Cambridge and Oxford, where only Anglican clergy could teach. Most importantly, he taught scholars how to think. Science among Christians rested on **Aristotle**, i.e., all species and the heavens were fixed by God for all time. He said, “I have taken all knowledge to be my province.” Most importantly, he argued that the universe was a problem to be solved and thought about. **For Bacon**, natural philosophy’s validity was its usefulness. He moved England to accept science. Cambridge & Oxford at the time were dominated by **Aristotle**’s ideas, not experiment & observations. **Whewell** (1840) a historian of science said he was the most important hero of the revolution of the scientific method. **Bacon** advocated using measurement and controls in scientific experiments.
Medicine: Li Shizhen, Chinese, described c1,000 plants and c1,000 animals, with 8,000 prescriptions based on them, plus a smallpox injection. Chinese, practical, had no personal omnipotent god as the source of power in the cosmos. Unfortunately, China did not experience a scientific revolution like the West.

Optics: The first true microscopes were made, building on Ibn al-Haytham’s Optics (1011-1021), now credited to three different eyeglass makers in Holland, Hans Lippershey, Sacharias Jansen, and his son Zacharias.

French King Henry 4’s Edict of Nantes allowed Protestants to practice their religions, but not attend universities.

Francis Bacon, Cervantes, Galileo, Gilbert, Kepler, Herbert, Grotius, Boyle, Mersenne, Descartes, Hobbes, Leeuwenhoek, Pascal, Huygens, Harvey, Molière, Fabricus, Hooke, Steno, Cassini, Roemer, Shakespeare, Spinoza, Halley, Newton, Leibniz, Locke, Bayle. Russell said Kepler and Galileo began the long fight between science and dogma. It was the beginning of the idea of progress. Due to Erasmus & other critics, the Church became an object of disdain to many elites.

The Med was still the center of the Western world, & Venice was the leading city, away from the stifling influence of the Vatican. The elders of Venice had hired Galileo to teach at Padua, The refining of the scientific method was the major development of the 17th century & the key to progress in many kinds of knowledge, more important than any particular invention, & enabled by developing tools of measurement.

In the West, science became the most distinctive human activity. Galileo wrote in Italian for the Middle Class, unlike scientists like Newton, who wrote in Latin. The number of geniuses who influenced and advanced modern society through inventions or philosophical or economic or political thinking was infinitesimal and their audience was also small, only other educated elite. Literacy grew in cities only. Almost all serious scientific advances attacked some Aristotelian error. In the 17th century, secularism (the idea that God is irrelevant to concepts of morality) became a strong influence in European intellectual thought, although not of the masses, who continued unaware, ignorant, illiterate, superstitious. The center of the Western world, with new trade routes going to America, was shifting to the cities of N.W. Europe.

c1600 Commerce, Sugar: Muslims first brought sugar to Spain from Morocco; Spain took it to the Caribbean. Sugar became the largest industry in the world. Its use was the most profound change in Man’s diet ever. Sugar plantations needed workers. The solution was slaves from Africa. Sugar interests controlled Parliament. Catholics couldn’t be king. Linda Colley’s Captives says Muslims enslaved perhaps 1.5M Europeans & Americans in North Africa between 1530 & 1780.

Physics: William Gilbert (1544-1603), Queen Elizabeth 1’s physician, published De Magnete, which said that the Earth itself is a magnet 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. Gilbert agreed with heliocentrism. His ideas caused little stir.

Science: Bacon (ref.1592) favored Induction over Aristotle’s emphasis on Deduction, as Deduction was based on assumptions (supposedly universally true) which seemed logical & intuitive, but perhaps false as not based on experimentation and measurement. In Induction, the specific premises support the conclusion, but don’t ensure it. “Knowledge is power” [over nature, not political power] paraphrases a 1597 statement by Bacon. He was the first great statesman of science. He saw the necessity of schools & researchers. He called Induction his “great machine.”

Galileo & Bacon were the first to forthrightly challenge Aristotle’s thinking that had dominated science & philosophy for c2000 years. A true Renaissance man and believer in God, 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. Unwisely, he was ignorant of and deprecated the use of mathematics to physical inquiries. While he thought reason could show God existed, all else in theology was known only by revelation.

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.” (More Francis Bacon 1605, 1620)

Dogma vs. reason: Pierre Charron (1541-1603), French priest, in 1594, in Three Truths had argued that God existed & that Catholicism was the true religion. In 1601, he published De la sagesse, a description of his friend, Montaigne’s philosophy of modern skepticism, i.e., 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. Man’s qualities are vanity, weakness, inconstancy, and presumption. Charron added his own notion that doubt gives Man comfort and security. It described Montaigne’s cultural relativism. He was skeptical like Montaigne but more cynical. Three Truths was considered a compendium
Anatomy: Hieronymus Fabricius, Italian, Veins, not arteries, had 1-way valves. The heart pumped blood thru arteries

In *Advancement of Learning*, Francis Bacon wrote, “Knowledge grows as we observe, measure, & describe objects or natural phenomena (the science of mathematical physics). We are not to imagine or suppose but to discover what nature is or may be made to do...They are all discoverers that think there is no land, when they can see nothing but sea.”

Literature: Miguel de Cervantes Saavedra (1547-1616), likely a disciple of Erasmus, from a Converso family, a Muslim prisoner for years, wrote *Don Quixote*, a novel mocking chivalric romances of the day. Quixote tilted at windmills, forever being tricked & cheated, seeking the impossible dream of justice in an earthly paradise. “There are but two families in the world, the *Have-much* and the *Have-little*. *Don Quixote* is the most translated book in the world. Quixote and Sancho Panza are the best known fictional characters in literature. Poetry in the vernacular advanced.

Galileo described the acceleration of falling bodies (*Newton’s 2nd law*), lectured on a new star beyond the moon, showing change in the heavens. In 1606 he invented and sold “Military Compasses,” an early type of slide rule.

Shakespeare described the wanton devastation of the wars of religion, *Macbeth*, “Tomorrow & 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.”

Jamestown founded. Survival was tough. Slaves arrived in 1619. Tobacco became America’s first viable cash crop.

Optics: The first telescopes were credited to Dutch eyeglass makers. Hans Lippershey patented a *refracting* telescope, but others also claimed the invention. A *refracting* telescope has a strong (short focal length) concave lens near the eye, the ocular lens, and a weak (long focal length) convex lens at arm’s length, the objective lens.

Political Theory: the concept of the Nation State: Johannes Althusius (1563-1638) German, a Monarchomach, 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 could not 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) used the concept of a social contract as the basis of the most imposing intellectual justification of absolute state power ever presented, absolutism.

Johannes Kepler (1571-1630), German, inherited Brahe’s data, had, without a telescope, in 1604, studied a widely seen supernova and said light diminished in intensity by the square of the distance it traveled. In 1609, he published *Astronomia Nova /The New Astronomy*, with a description of a new supernova, and the first two of his three still-valid laws of planet’s orbits that explained the epicenters and elliptical orbits of planets (whose speed increases when nearest the Sun). Ellipses dismayed all then astronomers.

He put Copernicus’s heliocentrism into precise mathematical formula, while discarding most of Copernicus’s postulates. Before Kepler, the heliocentric theory had few adherents. Kepler said, “God is praised through my work.” He also published *On the Motions of the Planet Mars*. Papal authorities denounced him his three (principal) laws of planetary motion are: (He discovered numerous other lesser laws.).

Kepler’s three planetary laws
1. Planets revolve around the Sun in elliptical orbits; (not circular but close to circular. This ignores the slight effect of the gravitational pull of the other planets, a problem that was not addressed until Newton.)
2. A radius vector joining a planet circling the Sun sweeps out equal areas in equal times. (It goes faster when it’s closer to the Sun). This was not generally accepted until Newton’s *Principia Mathematica* in 1687.
3. (published in 1619) The further from the Sun, the longer a planet’s orbit around the Sun. Specifically, the average distance to the Sun cubed is proportional to the orbit period squared. He showed that this also applied to Jupiter’s moons. This let astronomers calculate all planets’ orbits.

Before Newton’s *gravity*, Kepler held that some force of attraction held the moon in orbit around the Earth. The Protestant Consistory in Stuttgart told Kepler “not to throw Christ’s kingdom into confusion with your silly fancies.” The Vatican put his laws on the *Index*. His mother was accused of witchcraft and threatened with torture. Kepler’s laws enabled persons to calculate the distance to the Sun of every planet. He was the first to say that planets’ orbits depended on physical mathematical forces, not divine will. Thus he joined physics and astronomy for the first time. He wrongly thought the speed of light was infinite, reasoning that in space there was no impediment.

Astronomy: Based on a report of, but not a description of, a telescope, Galileo built a 10 power *refracting* telescope & showed it to the Venetian Senate from atop Venice’s Campanile (bell tower). It could see ships 50 miles away. Galileo then constructed a 30 power telescope and saw the Moon had mountains and valleys. He measured the heights of the Moon’s mountains by the shadows they cast. He saw the *Milky Way* was an immense number of faint stars. He saw 4 moons around Jupiter (so the Moon’s orbit around the Earth was not unique). He saw Venus went through phases like...
the Moon, which proved that Venus orbits the Sun, not the Earth. He detailed stars previously too faint to see, far more than thought of, confirming Democritus's and ibn-Biruni's speculations. He saw sunspots. He thus made the telescope an instrument of research. The telescope released the human imagination more than any other device.

Astronomy: Galileo returned to the U. of Pisa. He wrote & published his findings re the Moon, Jupiter, and its 4 moons in Sidereus Nuncius /Starry Messenger with a map of the Moon that exists to this day in the Vatican. It astonished the world. He showed his telescope to the astronomers at the Jesuit Collegio Romano observatory of Christopher Clavius. His observations were confirmed by astronomers in England, France, and Clavius's Collegio Romano. He was made a member of the Academia dei Linci./ Lincean Academy at a banquet held for that purpose. This honor greatly helped him... But his findings annoyed Pisa’s powerful philosophy faculty. Contradicting Ptolemy was offensive to them. In a debate, he 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..

Christianity: Bloody warfare continued between the Protestant Union and the Catholic League. King James in 1609 had told Parliament, "Kings are justly called Gods, for 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, citing 1 Peter 2:17 and Romans 13:17. To unite Anglicans, James published the Bible in English, The King James Bible (used herein), at least 3/4 of which was from Tyndale and Wycliffe.

Galileo privately circulated his 1610 Sunspots Letters which described that sunspots moved, so concluded that the Sun itself rotated. [The Sun rotates once every 2.7 Earth days.] Sunspots Letters also laid out Galileo's view of the principle of inertia (pre-dating Newton's first law of motion). Sunspots was really about the right of a scientist to teach and defend his scientific beliefs. Other European astronomers also saw sunspots. Galileo published Discourse on Floating Bodies, used principles of Archimedes to develop elementary hydrostatics.

The Lincean Academy in Rome printed Galileo's Sunspots Letters. Catholic clergy reacted. Monsignor Arturo d'Elci, overseer of the U of Pisa, forbid astronomer Castelli, a student of Galileo, to mention sunspots or any motion of the Earth, to his students. Mention of sunspots was banned at Catholic universities across Europe, in Spain even until the 19th century. Galileo wrote a letter to Castelli describing heliocentrism, that the planets including the Earth, itself revolving, orbited the Sun. A copy reached the Vatican.

Dogma vs. reason: Severe opposition to heliocentrism came with Kepler & Galileo. Pope Paul 5 saw it as an assault on the Church. It was an unimaginably huge blow to the psyche of Christians. For all of history, the night sky appeared to revolve around the Earth. This was an argument for theism. Einstein 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 Man himself became untenable."

Catholics can't mention sunspots

Catholics attacked Galileo: Dominican Friar Tommaso Caccini in Florence denounced heliocentrism and Galileo personally and even mathematics itself. "Geometry is of the Devil...Mathematicians should be banished as authors of all heresies." Galileo then was the most eminent scientist in Europe. He ridiculed alchemy.

Mathematics: John Napier, Scot, invented logarithms to quickly do tedious multiplications and long divisions.

Heresy The Inquisition in Rome began to investigate Galileo. Friar Niccolo Lorini told the Inquisition that Galileo was a heretic. Monk Paolo Antonio Foscari, a friend of Galileo's, tried in vain to reconcile Scripture with heliocentrism. A committee of cardinals / qualifiers told the Inquisition that heliocentrism was absurd in philosophy and heretical.

Roberto Cardinal Bellarmino, chief Catholic theologian, insisted physical reality was explained not by math but by the Scriptures and the Vatican. “To admit otherwise would discredit the Church’s deepest beliefs.” He was right. Bellarmino told Galileo and Foscari to treat heliocentrism only hypothetically as it was harmful to the Church.

Dogma vs. reason: The Index banned all works that said the Earth moved, including Kepler's Nova Nova Astronomia and Foscari's attempted reconciliation of heliocentrism and the Bible. Copernicus's Revolutions was taken out of circulation. Europe's intelligentsia disdained the Church's fight against heliocentrism.

Bellarmino could have used Augustine's method of interpreting the Scriptures not literally, go below the “surface” plain meaning (i.e., "What this passage really means is...") to avoid conflicts between science and dogma, as modern Christian theologians routinely do, and, in fact, as Galileo himself suggested, but in vain. Galileo was called an atheist. Galileo wrote that tides were caused by the uneven rotation of the Earth, his one major scientific error.

Dogma vs. reason: Lucilio Vanini, 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 Inquisition cut out his tongue, murdered him.

Juan Mariana, Jesuit priest, argued that the social order derived from nature & that governments evolved to protect
property. So the community's interests prevail over a ruler's. Said that the purpose of the state is to worship God.

1620 Puritans (Pure) in England found Anglicans too "popish." Moved to Holland. Then in 1620, they sailed for Virginia; winds blew them to Plymouth, Mass. Puritans treated women like cattle, had slaves. Colonies paid bounties for Indian scalps

1620 Logic, Francis Bacon; (ref. 1592, 1600 & 1605) In Novum 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. To acquire knowledge, one must interpret the particulars given in sense experience.

Novum Organum

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 fact. It denounced those who have "endeavored to found a science on the books of Genesis and Job." He said, "Custom (culture and cultural conditioning) is the principal magistrate 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.”

But still a believer, he said the goal of science is the glory of the Creator. He, like da Vinci, was an advocate of Induction (rather than the more certain but rarer Deduction). To answer the fact that an inductive conclusion isn’t 100% sure, just an inference, he advocated finding a negative instance to falsify a conclusion of induction, (anticipating Popper 1920). Positive confirmations and better premises strengthen conclusions from induction.

Bacon named 3 discoveries that set his age apart from ancient times, printing, gunpowder, and the magnetic compass. But he did not appreciate the importance of mathematics. Bacon was likely the source for Newton's disdain for hypotheses. Novum Organum said that mankind’s thinking was led astray by idolatry of four kinds:

1. Idols of the tribe, common to all people, i.e., the tendency to oversimplify, expecting more order in nature.
2. Idols of the mind, idiosyncrasies, prejudices, characteristics dear to an individual, deriving from his history.
3. Idols of the marketplace caused by loose language, of the tyranny of words, and escaping their influence.
4. Idols of the theater, prejudices, from received philosophical or religious systems, “so many stage plays, representing worlds of their own creation after an unreal and scenic fashion...Many more plays of the same kind may yet be composed and in like artificial manner set forth.” He warned that science itself is not immune from tradition.

In his Silva Sylvarum, he 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. Anticipating Darwin, he 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.” This long before the length of geologic time and the nature of fossils was known. Darwin later wrote, “I worked upon the true principles of Baconian induction.”

1624 Dogma vs. reason: The Church was in the midst of the Protestant Revolt, vying for its place as the one authentic interpreter of the Bible. Galileo returned to Rome as he felt he had better proof of heliocentrism. He based his defense of heliocentrism on his incorrect theory of tidal motion. The new pope, Urban 8, who in 1611 had defended Galileo’s anti-Aristotle arguments re floating bodies, told him to discuss heliocentrism only hypothetically until he had definite proof. Galileo returned to Florence to put his proof in a book. Galileo 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 resurrected Pythagoras’s vision of math not for its own sake but to clarify the nature of physical relationships.

1624 Deism: A creator made the world, let it run naturally

Religion, deism: Edward Herbert (1583-1648), diplomat, metaphysical poet, historian, and philosopher, the father of deism, advanced an anti-empirical theory of knowledge. Said the common articles of all religions apprehended by instinct, have a creator, duty of worship and repentance, future rewards, and punishment. Herbert published On Truth which said “Instructed reason” is the surest guide to truth. The common beliefs of religions inferred a deity, but nothing more. All dogma added by churches was irrelevant. He then posited a religious philosophy, deism.

Deism is belief in natural religion based on human reason rather than revelation; emphasizing morality but denying that the creator interferes in the natural laws of the universe. An impersonal deity created the universe but then let it run according to natural laws. Deism was thus a religious philosophy as it posited a divine creator, but not any particular organized religion or dogma, said organized clergy were simply human creations. Deism had no churches or priests.

1924 Hobbes, Jefferson, Washington, Locke, Paine, Voltaire, Franklin, John Adams, Madison, Pope, Rousseau, Adam Smith, Robespierre, Hugo, Ethan Allen, Twain, Laplace, Herschel and most philosophes of the Enlightenment were deists or heavily influenced by deism. Deists considered the Bible superstition. Protestantism begat religious pluralism, that begat religious skepticism, that advanced the breakdown of the Christian world view.

Chemistry: Jan van Helmont, Flemish, said air was a mixture of gasses. King James expelled Jesuits from England.

1625 Bacon, “Nothing is terrible except fear itself.” In his Essays (1625), “If a man will begin with certainties, he shall end in doubts; but if he will be content to begin with doubts he shall end in certainties...No pleasure compares to standing
**Bacon quotes**

upon the vantage-ground of truth...Be so true to thyself, as thou be not false to others...Riches are for spending.” He identified the fallacy of selective perception, where Man accepts results that agree with him and ignore those that don’t.

**1625 Hugo Grotius**

Political Theory, State Sovereignty: Huig de Groot / Hugo Grotius, Dutch (1583-1645), “Father of International Law.” His great treatise, De Jure Belli ac Pacis / Concerning the Law of War and Peace (1625) was written in prison, from which he escaped in a chest supposedly full of books, with the aid of 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.

He 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, “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.

He 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. Natural law based on reason exists even without God. He also introduced the concept of natural rights of individuals. On the other hand, he said that governments should not include the poor, women, or strangers in their public councils.

Andrew Dickson White (see 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 came an evolution of humanity that still continues.”

**1628 William Drummond**

Scot: “He who will not reason is a bigot; he who cannot is a fool; he who dares not is a slave.”

**1628 Biology: William Harvey** (1578-1657), Brit, said that there’s a single system of blood circulation. The heart pumps blood thru arteries which returns through veins to the heart and lungs. All creatures come from eggs.

**1631 Religion: Jesuit Frederick Spee’s Cautio Criminalis** condemned the cruelty and injustice of witch hunts.

**1632 Galileo contradicted the Church**

Augustine’s allegorical City of God had become (due to Aquinas) the heavens, the city of Man was the Earth. To question this immutability was unacceptable. The heavens were the promise of God to the faithful. Galileo published in Italian Dialogo del due massimi sistemi del mondo / Dialogue on the Two Chief Systems of the World, (the Ptolemaic and the Copernican), wherein an anti-Copernican simleton quoted certain of Pope Urban 8’s words from a private conversation he had had with Galileo. Using Italian gave it a wide audience. Urban 8 took offense. In fact, Galileo’s proof was still based on his incorrect theory of tides; so his proof was faulty. But the merits of Galileo’s proof were irrelevant. He was charged simply with teaching heliocentrism, a thought crime.

**1633 Christopher Marlowe** (1564-1593), In The Jew of Malta, “I count religion but a childish toy, & hold there is no sin but ignorance.” Also wrote The Tragical History of Dr. Faustus, make a deal with the Devil. In 1808 also done by Goethe.

**1633+ Galileo on trial**

Dogma vs. reason” The Roman Inquisition, ten Dominican cardinals, tried Galileo. He had no lawyer or a copy of the charges against him. They convicted Galileo for “vehement suspicion of heresy,” not heresy itself, for teaching heliocentrism, 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.

Repeatedly threatened with torture on orders Pope Urban 8, Galileo recanted his belief in heliocentrism. 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. The Church widely distributed his recantation. The Church decreed that scientific hypotheses could not contradict the Scriptures in any way.

The Church won the battle; it silenced Galileo, but of course it lost the war. Galileo’s recantation was dismissed by scholars as coerced. Scientific inquiry inexorably advanced beyond Vatican influence.

Galileo returned to his house in Florence, but did not give up his studies. There he measured the force of gravity. Notwithstanding Kepler’s ellipses and like Copernicus, Galileo incorrectly thought planets’ orbits were circular.

**Legacy: The role of science**

Galileo introduced the concept of relativity, 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. Galileo advanced science in 4 main areas, telescopic astronomy, laws of motion, use of math, and use of experiments. The conflict between Galileo and the Church was about the role of science itself in the world. Basically, Galileo’s whole being was an affront to the Church. He said, “I do not feel obliged to believe that the same God who has endowed us with sense, reason, and intellect has intended us to forego their use.” Galileo intended to use his intellect even if it conflicted with the Church’s dogma. Galileo risked his freedom for science itself, and the theory of another man. Galileo said that what he could prove by experiment & math was true. He caused an intellectual revolution by proposing that physicists should discard Aristotelian essences & that the only way to find out what was happening
was to observe, experiment, & measure, empiricism. In experiment, look for the nearest cause for a phenomenon (Ockham's razor), & realize that the universe could be reliably observed & should be reduced, if possible, to math.

Theology: The Bible, Koran, and the Book of Mormon have messages of mercy and tolerance, plus statements about the world scientifically false. (Much Christian theology asserts that the factual errors in the Bible (inspired by God) don’t really mean what they plainly say. Some persons, fundamentalists, simply believe the Bible’s words as literal truth, biblical inerrancy. (Jewish theologians have similar difficulties with their scriptures.)

The Church’s persecutions of Bruno, Vanini, and Galileo largely stopped scientific inquiry in Catholic Europe. So, the center of science shifted 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.

Natural philosophy / science: Marin Mersenne (1588-1648), was a French Minorite friar, mathematician, natural philosopher, but most importantly, corresponded with all the leading scientific thinkers of the day, spreading their ideas to each other. In 1634, he published Questions, & advanced the development of the Scientific Method that had been forbidden to Italians. His formula: 1. Reject all previous authority. 2. Base all results on direct observations (empiricism), & 3. Ground all understanding of natural phenomena in mathematics (ref. Descartes, Galileo, Francis Bacon).

Europe was in a time of crisis with many Protestant sects, murderous religious wars, and humanism spreading. The Muslim, Chinese, Japanese, and Hindu civilizations were scarcely affected. They stagnated in relative isolation.

Philosophy: Rene Descartes (1596-1650), French, with a Jesuit education, was the founder of modern philosophy and the most important philosopher since Aristotle. He was intensely curious. His philosophical scheme was based on relentless skepticism. He brought together all the leading ideas of the 17th century. A rationalist, held the medieval view that truth requires certainty. This fell when empirical science showed that scientific truths are always tentative, subject to better truths. He devised integral calculus at an early age and founded analytical geometry. He is reputed to have designed a barometer in 1631 but did not construct it. He wrongly thought the speed of light is infinite.

Although deeply Catholic, he did more to undermine the Church’s authority than any other person, simply as he created a scientific methodology that revolutionized how mankind thought, ignoring divine revelation. He was also the father of & major figure of modern continental rationalism, later used by de Spinoza & Leibniz, as a guide to finding truth as opposed to the empiricist school of Hobbes, Locke, Berkeley, & Hume. Both rationalism & empiricism denied Christian dogma. He was in the Bavarian army for 9 years, then lived in Holland to avoid French Catholic repression.

Dogma vs. reason: After years of study and travel, he finished Traite du monde et de la lumiere which organized all current knowledge into one great structure, including the first complete statement of the law of inertia. The Church condemned him, and he did not publish it.

Instead, in 1637, he published, anonymously and in the vernacular French, not in the scholar’s Latin, Discours de la methode /Discourse on the Method of Rightly Conducting Reason and Seeking Truth in the Natural Philosophies. He was dissatisfied with the lack of agreement among philosophers. Said, “There is nothing so strange or so unbelievable that it has not been said by one philosopher or another.” He decided that philosophy needed a new method. This thought struck at the skepticism then current. He wanted to show that at least some things are absolutely true. He wanted 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. He rejected one’s senses as they were unreliable. Even reason was fallible, including his own. Only thinking itself was indisputable.

As the mind cannot be doubted, but the body and the material world can be, they must be different, Cartesian dualism. (Anaxagoras had also separated mind from matter.) He adhered to four rules in developing his ideas.
1. Accept no statement unless it was clear and distinct and was based on good evidence.
2. Divide any problem into as many elementary parts as possible, and resolve each one. Reductionism (see Index)
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. Contrary to Locke’s 1690 tabula rasa and before Kant’s similar a priori knowledge (1755), he felt the mind had certain inherent attributes/capabilities which were not the result of experience which enabled men to make sense of phenomena.

Descartes classified ideas as: 1. Innate ideas, that originate from within, such as the idea of self, 2. Adventitious ideas that come through the senses, and 3. Factual ideas that are made up from the elements of ideas of other things. As the physical world was different from the mind, it could be studied by reason & mathematics. Discourse said that the body works like a machine & follows the laws of physics, whereas the mind (or soul) is immaterial & follows its own set of rules & could be studied separately (reflecting Christian belief more than reason). The laws of mechanics are the same as the laws of nature & so understanding the universe could be done by mathematics, which Man could do.
God would not fool Man, so use reason

As God was perfect, He would not deceive Man and so what Man could figure out 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 Discourse he doubted everything doubtable; that is, everything that did not pass his criterion of truth, clear & distinct ideas (self evident truths). He started with the fact that he was able to think, and concluded therefore that he existed. (Je pense, donc Je suis! / I think, therefore I exist) From his self evident truths, he deduced other truths back into existence by evidence. So the thinking person was then at the center of his inquiry, not things (Aristotle) or forms / ideas (Plato).

The Graph

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 had devised the idea of constructing co-ordinates to represent pairs of numbers relating to algebraic terms, usually X & Y. He had created the graph, which turns pairs of numbers represented by X and Y into meaningful shapes, (called coordinate geometry or Cartesian geometry.)

This changed geometrical problems into algebraic problems & unified algebra & geometry into analytic geometry, the first big step toward today’s integrated structure of mathematics. It allowed both geometry & algebra to address the same problems. It transformed the world of mathematics and influenced the work of mathematicians and astronomers. He also deduced that secondary rainbows resulted from two internal reflections in raindrops.

He wrongly thought light traveled through aether, an invisible substance that filled space. By this time, geometry (with trigonometry) had become the best understood mathematical discipline. Algebra less so. He said, “It is not enough to have a good mind. The main thing is to use it well. And, "The whole of philosophy is a tree whose roots are metaphysics, whose trunk is physics, and whose branches are the other natural philosophies.

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 uncertainty / unreliability of most everyday perceptions. Other scholars including Hume, Hobbes, and A J Ayer also questioned this argument for its unreliability.

1638 Galileo tried to measure the speed of light but his instruments were not accurate enough. He finished his scientifically most important book Discourses and Mathematical Demonstrations Relating to Two New Sciences, but could not get it published in Italy. So his followers smuggled it to publishers in Holland. In 1638, he also became blind. Although blind, he designed (but didn’t build) an escarpment to improve the pendulum clock. (Huygens succeeded in 1656.) Weeks before Galileo died in 1642, Hobbes visited him and told him that Revolutions had been translated into English.

1638 The Tokogawa Shogunate cut ties with the West, isolated themselves off from all the benefits of the scientific revolution (for 200 years). Japanese abroad weren’t allowed to return. Japan’s foreign trade went down 99%.

1641 Descartes said the existence of a loving God was logically necessary for the evidence of the senses to be meaningful. He published his life’s work, Meditationes de prima philosophia / Meditations on First Philosophy in Latin for the learned audience, wherein he demonstrated God’s existence and the distinction between the human soul / mind and body. He wanted to make natural philosophy less threatening. Meditations said, “ego sum, ego existo” / I am, I exist.

1641 Dogma: Massachusetts Colony Book of Liberties, “If any man...shall worship any other god, but the Lord God, he shall be put to death. If any man or woman be a witch...they shall be put to death. If any person shall blaspheme,...death.”

1643 Evangelista Torricelli invented a barometer, where atmosphere pressure supported about 30 inches of mercury.

1644 The new Qing Dynasty emperor wanted Western scientific learning. The Jesuits brought in experts of many types, but their main subject was astronomy. They taught that the Earth was the center of the universe. The Chinese learned of Copernicus and heliocentrism only accidentally in 1760, a century later.

Descartes was a devout Catholic. His theology was Middle Ages. He published Principia philosophiae (207 principles), his replacement for Aristotle. It synthesized Discourse & Meditations. He repeated his trademark motto in Latin, as “Cogito, ergo sum.” / I think, therefore I exist. Much of Principia was his Argument from the Idea of God, like Anselm’s 1078 Ontological Argument for God, but where Anselm emphasized greatness, Descartes emphasized perfection.

Specifically, he wrote, “God’s existence is inferred from the fact that necessary existence is 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.

Descartes also argued that the existence of a loving God is logically necessary for the evidence of the senses to be meaningful. When he died in 1650, Louis 14 prevented his burial in France.

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. Also, “That our will is free is self evident.” 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)

Largely due to Descartes, the world of the non-material, i.e., theology, which had been the focus of scholarship for over a thousand years, lessened in interest for Renaissance thinkers. Before Descartes, dogma was the predominant course of study, mathematical physics a minor science. After Descartes, it was reversed. This was one of the most radical changes in the history of thought. Universities established chairs in natural philosophy.

1646 The Levellers, Brits. led by John Lilburne, argued for universal suffrage, equal electoral districts, biennial parliaments

1648 Killing for God: The Thirty Years War (1618-1648) between Catholics & Protestants, the bloodiest war before the 19th Century, left much of Europe depopulated (Germany’s population went from 17M to 8M.), destitute, in ruin, traversed by pitiable bands of refugees. Cossacks slaughtered many thousand Jews. The Treaties of Westphalia (Muenster & Osnabrueck) ended the war, simply ratified the political realities; Switzerland and Holland became independent; c300 principalities, free cities and bishoprics became de facto sovereign; princes chose their land’s religion. The treaties effectively ended the pope’s pan-Europe political power. Pope Innocent 10 attacked it as null void, invalid.

1649 Oliver Cromwell (1599-1658), admirer of Machiavelli, religious Puritan, led a civil war against Charles 1. Cromwell pleaded to the Assembly of the Church of Scotland that they give up their allegiance to Charles, “I beseech ye, in the bowels of Christ, think it possible ye may be mistaken.” In 1649, Charles 1, supported by the Anglican Church, tried to rule without the participation of Parliament, was beheaded. Parliament declared, “The People are, under God, the original of all just power...Commons (themselves) 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, white, male, propertied, was at the time hugely unrepresentative of the people. Perhaps 4% of adults could vote.

In 1652, as head of the army, Cromwell killed tens of thousands of Irish and Scots, men, women, and children and brutally massacred the inhabitants of Drogheda, Ireland. He is of course still rightly hated by the Irish. The ruling class (clergy, professionals, land owners) in mostly Catholic Ireland were Anglicans. This was known as the Protestant Ascendancy. Catholic lands were confiscated and sold to Englishmen and Anglicans.

1650 Theology: Bishop James Ussher of Armagh (1581-1656), Anglican Primate of All Ireland, Privy Councillor. Despite the fact that Anglican dogma was copied almost entirely from Catholic dogma, wrote, “The religion of the papists (Catholics) is superstitious & idolatrous; their faith and doctrine erroneous and heretical;...to give them a toleration or to consent that they may freely exercise their religion is a grievous sin.” He said that God created the Earth on October 22, 4004 BC and that Adam and Eve were driven from paradise 18 days later. This agreed with then current Christian thinking but no one had previously made such a precise calculation. Kepler had figured 3992 BC. Jews had said 3761 BC. A colleague of Martin Luther, Philip Melanchthon, had said 3963.

c1650 Antoine Arnauld’s The Art of Thinking posited 4 operations of the mind, conceiving, judging, reasoning, & ordering.

1650+ Background: The intellectual & commercial center of Europe had shifted to N. Europe. The failure of Europeans to agree upon the truths of religion, within as well as across state boundaries, furthered secularism & modern science. In states where the Reformation (Protestant) came closer to success, i.e., where lay & church forces joined to impose an almost religious conformity, it caused intellectual stagnation. Religion became more private. A merchant class grew. The collision and interaction between the Renaissance and the Protestant Revolt / Reformation, raised the intellectual and moral energies of Europe to a new height. No later time has been so revolutionary. The common languages, French, Spanish, Portuguese, and German were used more. In France, nobles were lightly taxed. States turned to frontier & colonial expansion. Spain imported gold & silver. Furs from Siberia & Canada, & gold & diamonds from Brazil (from 1695) were the most important imports. Europeans transformed the Caribbean into sugar plantations based on slavery. Exploration slowed; trade expanded. Hundreds of Spanish & Portuguese missionaries turned South & Central America into Catholic countries. In turn, Islam spread across Central & Southeast Asia.

1651 Political Theory, Thomas Hobbes (1588-1679) a royalist, founding father of metaphysical materialism, wrote Leviathan, defended absolute monarchy. Man is material particles in motion. He disputed Descartes’s separation of mind from matter. The two basic “passions” of Man were appetite & aversion. Happiness is getting as many of the good things one desires & power is the means of getting such objects. Thus, power is a basic characteristic of Man, which leads to aggression against others. In the state of nature there is no right or wrong, only self defense.

Life in Nature: solitary, poor, nasty, brutish, and short.” So men enter into a social contract to establish a state to keep peace and order. (Hume later pointed out that there was no evidence any state had so begun [the Mayflower Compact?], that civilizations actually arose as communities of obedience.) Hobbes, Because men are selfish by nature, reasonable but predatory, a
**brutish, & short.**

Leviathan changed the subject of political thought from theology to anthropology, specifically the anthropology of religious passions. He asked how people act, and why do they believe God speaks to them. To understand that may lead to why religious convictions lead to political conflict / violence. He offended the rationalists by claiming that men, far from being capable of the highest intellectual achievements, were dangerous and aggressive creatures. Leviathan is thought by many to be the most influential political treatise ever written.

Hobbes also disdained Catholicism: He said, “The Papacy is not other than the deceased ghost of the Roman Empire, sitting crowned on the grave thereof.” We do not know anything about God other than that He exists. He called the Catholic Church the “Kingdom of Darkness.” Hell is a fantasy to control people. Like Spinoza, he analyzed the Bible as a mixed-up historical text. Said, Religion is derived from four mistakes, belief in ghosts, ignorance of second causes, devotion to what men fear, and taking of things casual for prognostics.

Hobbes said democracy was dangerous. “A democracy is no more than an aristocracy of orators. The people are so easily moved by demagogues that control must be exercised by the government over speech & press.” Said, that physics, psychology, & politics were the most useful fields of study. In war, force & fraud are the cardinal virtues.

**Blaise Pascal (1623-1662)** proved that air was not weightless, that air pressure decreased with altitude (we live at the bottom of a sea of air weighing about 14.7 pounds per square inch), that when pressure is put on a fluid in a closed container, it exerts pressure everywhere in that container (i.e., hydraulics), that a vacuum exists at the top of a barometer. Descartes disagreed, but Pascal was right. With Pierre de Fermat, he discovered the mathematical theory of probability. Before Popper (1920s), he said that to show a hypothesis is false, it is only necessary to show it leads to something contrary to a single one of the phenomena based on the hypothesis.

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 to 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. 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 so many men Christians ... Turks, etc. (more Pascal 1670)

Isaac de la Peyrere, French, wrote there were humans before Adam. The Inquisition burned his book, imprisoned him.

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**Huygens** discovered that Mars rotated (every 24.67 hours) and that Saturn had rings. Huygens and Galileo showed that force could act at a distance (magnetism and gravity do) and need not be directly applied. (more Huygens 1690)

Dogma vs. reason: Prince Leopoldo de Medici, an admirer of Galileo, funded and led an academy of experimental science, the Accademia del Cimento in Florence. Its only 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 it religious. It never really got off the ground. Leopoldo was not a cleric of any sort. But in 1667, Pope Alexander 7 made him a cardinal. Without him, the Academy faded.

How we think: Around this time, ancient theories of the mystical power of numbers, 3 and 7 especially, became part of Christian thinking, slowing scientific thought. Theologic and metaphysical substitutes for scientific thought like the notion that the perfect line is a circle, so planets must travel in circles, led astronomy astray even after Kepler.

The microscope was helping scientists as the telescope did. Formal scientific networks (the Republic of Letters) greatly aided the spread of scientific knowledge. The Royal Society began in London in 1660. The Academie des Sciences, Paris in 1666. Their meetings and journals spread scientific knowledge, breaking the monopoly of the universities, all under clerical control. Most Royal Society members were moderate Puritans and friendly to science. Its charter said their study of science was to glorify God. The center of most intellectual spheres was moving northwest from Rome.

**Biology:** Marcello Malpighi, Italian, discovered blood capillaries with the newly invented microscope, closing the circle...
of blood circulation Harvey had described in 1628. He wrongly thought humans pre-formed in the mother’s egg.

Robert Boyle Chemistry: Robert Boyle (1627-1691), Irish, advocate of Empiricism, established a lab at Oxford to study chemistry. He rejected Aristotle’s view that logical argument was sufficient to prove a case. Boyle published The Sceptical Chymist. It critiqued parts of alchemy (trying to turn base metals into gold) he thought ill-founded, although he experimented in alchemy. He criticized Aristotle’s view of 4 elements (earth, water, air, fire) & Paracelsus’s concept of 3 principles (mercury, sulphur, salt), & gave a definition close to what Lavoisier said a century later. Boyle speculated about the concept of absolute zero, the coldest that a substance could reach. Sceptical Chymist started chemistry as a rational and experimental science.

1661 Physics: Isaac Newton (1642-1727), the pre-eminent scientific genius of all time, entered Trinity College, Cambridge, where students had to swear an oath to Anglicanism. There on his own he discovered differential calculus to deal with bodies in motion. Algebra and geometry deal only with static objects. Calculus is the math of instantaneous rates of change, and it has two main branches. Differential calculus permits the calculation of these rates, such as finding tangents to curves, given the rate of change of some quantity, it derives the quantity itself, while integral calculus does the converse. (Leibniz (1710) virtually at the same time also discovered calculus.)

1663 Dogma vs. reason, chemistry: Boyle (1661) introduced the modern concepts of elements, alkali, and acid, promoted the corpuscular / atomistic view of matter. Boyle also discovered that air was necessary for the propagation of sound and for burning. Boyle described elements and compounds. He said there may be more than 4 elements, perhaps more than five. Chymist refuted Aristotle’s ideas on the chemical composition of matter. Anglican theologians at Oxford said his researches were destroying religion. Denying God was a capital offense. In 1664, Boyle wrote that the study of nature is to the greater glory of God. (more Boyle 1666).

1664 Descartes Treatise on Man

1665 Gravity has an inverse square force

1666 Hooke wrote the Royal Society, his employer, describing “a system of the world very different from any yet perceived...
Hooke founded on the following positions. 1. All the heavenly bodies have not only a gravitation of their parts, to their own proper centre, but that they also mutually attract each other within their spheres of action. 2. All bodies have a simple motion, & will continue to move in a straight line unless continually deflected from it by some extraneous force, causing them to describe a circle, an ellipse, or some other curve. 3. That this is so much the greater as the bodies are nearer.

Boyle (ref. 1661 & 1663) published The Origin of Forms and Qualities, with his view that everything is built of atoms, his mechanical view of nature. Origin of Forms also explained ideal gasses’ volume-pressure relationship, i.e., Boyle’s Law, “At fixed temperature, for a fixed mass of gas, its volume times its pressure is a constant. [P = absolute pressure, \( V = \) volume. The formula is \( PV = k \) (a constant)] i.e., double the pressure, halve the volume, etc.

Richard Towneley and Henry Power suggested it to Boyle. He published it. (See 1702 Amontons, 1787 Charles, and 1802 Gay-Lussac for the addition of temperature to the laws of gasses)

1666

John Wallis, Brit, suggested the law of conservation of momentum, which became Newton’s 3rd law of motion.

1670

Blaise Pascal quotes

“Saying God exists means adopting an entire way of life...Reason is inadequate to satisfy Man...Reason commands us far more imperiously than a master; for in disobeying a master, we are unfortunate, and in disobeying reason, we are fools. The supreme function of reason is to show Man 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 Man; 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.”

Dogma vs. reason: Jesuit priest Le Compte wrote that the Chinese had practiced Christian virtues for 2000 years. University of Paris clerics condemned him.

Galileo, Descartes, Voltaire, Diderot, de Chardin, Frederick Spee, Georges Le Maitre, all had Jesuit educations.

1670

Baruch Spinoza

His Treatise on Theology and Politics published anonymously in Latin (for only the educated), opened with, Religion “is organized superstition.” The treatise is a systematic critique of Judaism and all organized religion. He argued that theology and natural philosophy must be separate. Said Scripture does not teach natural philosophy and can’t be made to conform to it. Conversely, if reason is made subservient to Scripture, the prejudices of a common people of long ago...will hinder natural philosophy. He did not want the common folk to read it as it would upset their prejudices.
Like Hobbes, Spinoza showed that Moses could not have written the Pentateuch in the form then written. In hindsight this was elementary scholarship. Biblical scholars now agree. He rejected being called an atheist. He challenged the fundamentals of revealed religion, received ideas, tradition, morality, the divine authority of kings. Spinoza followed Hobbes in subjecting the Bible to rational study and examination. His Treatise was the most effective attack on Christian supernaturalism yet printed. The Church put it on the Index.

He criticized “opportunistic preachers” who play on people’s hopes and fears in the face of a judging God. His essay, On Human Bondage, circulated privately in 1673 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.

He doubted the divine nature of those laws that simply were used as a means of social control of the Jewish people, i.e., eat no pork. They were valid as they promoted the well being of the community, but they were not divine.

For Spinoza, the highest virtue of the mind was to know God (an absolutely infinite being). He could be considered the inspiration of the “radical Enlightenment,” contrasted with the more moderate Enlightenments of Voltaire.

He said happiness comes not from material goods or in unreflective attachment to the superstitions that pass as religion but from a life of reason. Spinoza was influenced by Maimonides (1160 and 1217).

Spinoza said, “There is no such thing as free will. “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.” A god that demands worship is not worthy of worship. Christians and Jews both disliked him. The chief end of human society for Spinoza was freedom, individual liberty. “Happiness is the rational understanding of life and the world.” He agreed with Hobbes that natural right is simply power, that Man is necessarily motivated by self-interest, and that the state is based in a social contract to secure individual interests, especially security.

The power of the state is the price Man pays for order and security (social contract?). The state should enhance Man’s chance of self-fulfilment. Obedience to the sovereign did not impinge on one’s freedom as one had willingly ceded to that sovereign the power to rule justly. 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, was democracy.

“The most tyrannical of governments are those which make crimes of opinions [Christianity, Islam] for everyone has a right to his thoughts.” Re the Problem of Evil, he 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 is too dumb.]

He wrote, “Philosophy has no end in view save truth. Faith looks for nothing but obedience & piety.” Like Anselm & Descartes, he posited an Ontological Argument for God, but, of course, his God was nature. He made his living as a lens grinder, turning down prestigious teaching positions including professor of philosophy at Heidelberg; he gave his inheritance to his sister. Spinoza believed that women were naturally inferior to men. (More Spinoza 1677).

Geology: Nicolas Steno (1638-1686), Dane, a founder of modern geology, wrote Dissertation Concerning Solids Within Solids. He posited that fossils were once living organisms that were left in softer materials which hardened. He discovered the principle of Superposition of geologic strata, i.e., younger strata are above older.

In Paris, director of the Paris Observatory, calculated somewhat accurately the distance of Mars to Earth by triangulation between Paris, Cayenne, and Mars.

He discovered the cell, the building block of life, and other 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 microscopy. He saw and described blood cells, spermatozoa (1677), and 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. Even though cells consist of trillions of atoms, they are still too small to be seen with the naked eye. 10 million would cover a pinhead. Unfortunately, after Leeuwenhoek, interest in microbes and animalcules faded and was not revived for 200 years.

Hooke published his “System of the World.” In 1678, he constructed a thirty power compound microscope and expounded the correct theory of elasticity. In 1679, he wrote Newton about, inter alia, celestial motion and an attractive motion towards the central body.

Newton’s Hypothesis of Light posited that light consisted of particles/corpuscles emitted in all directions from a source. Newton wrote to Hooke, “If I have seen farther than others, it is by standing on the shoulders of giants.” Newton hated Hooke, who was very short & deformed & claimed he found gravity first. “Gravity” was a common phrase at the time. Newton was jealous about his work. He also feuded with Leibniz and the Astronomer Royal John Flamsteed.
Roemer

1676 Speed of Light: Ole Roemer (1644-1710), a Dane at the Paris Observatory under Cassini, wrote that the apparent anomalous behavior of the eclipses of the moons of Jupiter could be accounted by a finite speed of light [contrary to Aristotle and Kepler]. He measured light reflected off Jupiter when Jupiter was closest to Earth and furthest away. From this, Huygens calculated light went 144,000 mps (low by c29%). Cassini dissed it. Roemer returned to Denmark.

Pantheism

1677 Pantheism: Spinoza (1670) posited a Pantheistic Argument for God by redefining God from its traditional definition, i.e., omnipotent, sovereign, all-powerful, into “the existence of this, that, love, truth, nature, beauty, or something else is obvious. Thus God exists.” He was the most eminent exponent of Pantheism (the word did not then exist). God is the essential substance / the principles of Nature. He said that philosophy was independent from religion.

Spinoza said that increased knowledge & understanding gives Man more freedom, as we are only free to the extent we know the opportunities before us; that the mind’s intellectual love of God is our understanding of the universe, our virtue, our happiness, our well-being & our “salvation.” “God’s decrees & commandments, & consequently God’s providence, are, in truth, nothing but nature’s order.” Things happen only because of Nature & its laws, methodological naturalism. (Philosophical naturalism denies the existence of anything supernatural.) This is not Christianity or Judaism.

He died at 44, perhaps from the glass dust from his lens grinding. He is considered one of Western philosophy’s definitive ethicists. His most important work, Ethica Ordine Geometrica Demonstrata, was published after he died.

1680 Pierre Bayle (1647-1706), Protestant, born in France but lived in the more intellectually open Rotterdam, where he was the leading member of the intellectual community. He wrote Miscellaneous Thoughts on the Comet of 1680. It was the first all-out defense of the morality of atheism. He recounted the morality of historical atheists. (more 1685),

1682 Dogma vs. reason: A comet seen over Europe. The pope ordered church bells across Europe rung to scare it away.

1684 Astronomy: Giovanni Borelli, Italian astronomer, Hooke, Christopher Wren, architect & astronomer, and Edmund Halley, all tried to understand what kept the planets orbiting the Sun. They thought the Sun exerted some attractive force. Most scientists at the time believed that it varied in an inverse square ratio, that is, it diminished as the square of the distance between the Sun & the planet; a planet twice as far off would be attracted with one fourth the pull.

Halley asked Newton how planets stayed in their orbits and if the orbits were elliptical. Newton said that he had in 1666 calculated that such orbits were elliptical, but hadn’t published it. Halley urged him to publish it. So, later in 1684 Newton sent a full report of his study of Kepler’s laws titled De Motu to the Royal Society to register the priority of his ideas and worked on a more complete explanation of his ideas. See 1687.

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 distance. It also stated that planetary orbits were not precisely elliptical due to the gravitational attraction of all the Sun’s planets on one another.

Such modification to Kepler’s laws showed the difference between the mathematical accuracy / purity of Kepler’s laws & the physical reality where there were many centers of gravity, planets, interacting. This distinction was a revolutionary feature of Newton’s celestial dynamics. De Motu said that the calculation of the forces governing the planets’ orbits & their gravitational attraction to one another exceeded man’s ability to calculate. He suggested that a higher intellect, a God who created the universe, was needed to ensure the stability of the solar system. (In 1799, Laplace showed that the solar system did mathematically follow Newton’s laws of motion & gravity.)

1685 King Louis 14 revoked the tolerant 1598 Edict of Nantes, stupidly saying that as there were no Protestants left; it wasn’t needed. Bayle (ref. 1680) contended that the revocation was “an example of grotesque intolerance based on moral & logical absurdity.” Bayle wrote Commentaire philosophique, a classic for toleration in 1687. (More Bayle at 1696)

1686 Halley (1656-1742) said uneven solar heat on Earth caused atmospheric motions & discovered the relationship between barometric pressure and height above sea level. He had in 1678 identified 341 stars visible from the Southern Hemisphere, earning membership in the Royal Society. In 1690, he built a diving bell and a liquid-filled
magnetic compass. He was denied a post in astronomy at Oxford due to his atheism. Only Anglicans could go to Oxford or Cambridge, England’s only universities until 1826, and where peers got a diploma without examination. Scotland had four universities. Trinity College in Dublin, founded in 1592, admitted only Protestants until 1793.

The Enlightenment was a cultural / intellectual movement of European, principally French / British / Scottish intellectuals, dating roughly from c1688 to c1790 that sought to use the power of reason to reform society & advance knowledge. Its defining aspect was the investigation of human nature & man’s relationship to society. It was a value system rather than a set of beliefs with the common goals of progress, tolerance, & against Church & state abuses.

A religious awe in the new sciences arose, & it put God not in scriptures but in the natural world (Spinoza), or just at its beginning (deism). So, if God created nature’s laws, studying them was God’s will. Man’s natural instincts had always been to seek pleasure (Aquinas approved as long as it was the right kind of pleasure, beatitude) & avoid pain. Most Europeans remained at least nominally religious, including many 17th century scientists who had broken from the scholasticism then dominant in universities, like Bacon, Kepler, Galileo, Harvey, Gilbert, Kant, Boyle, Huygens, & Newton who all said that their studies revealed ordered laws of nature but with God as the lawgiver. The Enlightenment was characterized by questioning all the basic concepts that had governed Western thinking for millennia, i.e., slavery, the subjugation of women, God, the husband as absolute ruler of his family, an afterlife, the monarchy, sin, Original Sin (Is a god who sends unbaptized babies to Hell worthy of worship?), the Second Coming.

Kant decades later said the Enlightenment was “Mankind’s final coming of age, the emancipation of human consciousness from an immature state of ignorance and error.” Russell later saw it as a phase in a progressive development that began in antiquity and was a reaction to the Protestant reaction to the Catholic Counter-Reformation. While there was little intellectual contact between the West and China, the intellectuals of the Enlightenment found that the Chinese (Confucian) tolerant, humanitarian spirit & a well-ordered government proof that a society need not base its ethical and legal systems on religious sanctions.

Ideas of the Enlightenment were spread by popular books, such as Bernard de Fontenelle’s Plurality of Worlds which discussed heliocentrism, & by books about different cultures, which caused men to question the immutability of their own culture, & by Locke’s notion that the human mind at birth was a blank slate. Learned academies (French Academy of Science & The Royal Society of London), the book industry, scientific & literary journals, the “Grub Street Hacks,” coffeehouses, debating societies, & Freemason lodges, all played a part in the dissemination of Enlightenment ideas. Cambridge & Oxford played little role as they taught mainly classics.

1687 Principia: Newton developed his ideas about motion & gravity. He published, in Latin, books 1 & 2 of Philosophiae Naturalis Principia Mathematica / Mathematical Principles of Natural Philosophy (Science), his work on motion & gravity. He had given volume 1 to the Royal Society in 1686. It was an immediate sensation. Physics was then the only truly mature science. Like Descartes, Principia rejected Aristotelian principles. Principia distinguished weight (gravitational attraction) from mass. Halley paid to publish Principia. It was one of Newton’s few science writings.

Newton used both Euclidian geometry & his own developed calculus in Principia. 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 “bailed by little smatterers in mathematics.”

1687 Principia described Newton’s best known achievement, gravity, the basis of the Newtonian revolution in science. Namely, Every particle in the universe attracts every other particle with a force proportional to the product of their masses & inversely proportional to the square of the distance between them. Consequently, every planet has a gravitational attraction & acceleration towards the much larger mass of the Sun, which attraction diminishes as to the square of the distance to the Sun. Everyone had seen gravity work on a small scale. Newton put it in the universe.

Newton acknowledged that Hooke, Halley, and Wren believed in the inverse square ratio concept of the attraction, but he had shown its accuracy, a difference. The reality of gravity destroyed the Medieval picture of the world as a structure moved by an unseen but ever-present God. Newton thought of nature in terms of forces between objects. Principia showed that the motion of an object is described by a mathematical relation between the forces that act on that object & the acceleration it experiences. (Physicists then went looking for other laws of nature that could explain natural phenomena in terms of rate of change.) 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 & a truth that is demonstrated. Newton admitted that he did know how gravity works, only that it was real & measurable.

Three laws of Motion. Principia described Newton’s Three Laws of Motion (which he had decided on 20 years before), namely:

1. Inertia: Every body stays at rest or in motion in a straight line (as the case may be) unless another force [like friction or gravity] act on it. (ref. Mo-tzu (450 BC), Philoponus (549), al-Haytham and Avicenna (c1000), Ockham (1331), Galileo (1633), Descartes (1644), and Hooke (1665)). Aristotle had said being at rest was matter’s natural state.
2. A change in an object’s motion (acceleration or deceleration) is proportional to the force put on it, i.e., force divided by mass = acceleration. Or, force = mass times acceleration. \( F = ma \). Velocity is a rate of change. 

Accelration is the rate of change of a rate of change. Avicenna and Huygens had written this in quadratic form.

Newton reformulated it. Gravity causes a falling object near Earth to accelerate toward Earth at c32 feet/sec/sec.

3. For every action, there’s an equal and opposite reaction. Shoot a gun; there’s a recoil, total momentum is conserved, momentum of a bullet is equal & opposite to momentum of gun, building on Descartes’s & John Wallis’s law of conservation of momentum. Total momentum of a system is only changed by an outside force acting on it.

1687 Newton also said a cannonball shot horizontally from a height would orbit the Earth elliptically if shot fast enough. Kepler had based his Rules of Planetary Motion on observation and measurement. Newton explained them with his Laws of Motion & his Law of Gravitation. He introduced the concept of absolute space & time as frame of reference that would show whether a body was moving. He published Earth’s gravitational attraction to the Moon, which he had calculated in 1666. Principia unified Galileo’s physical mechanics & the celestial mechanics of Kepler & Copernicus.

An absolute time and space is the concept in Newton’s mechanics needed to specify the velocity of a body and its rate of change relative to a specific reference point. Newton thus postulated an absolute space and absolute time with respect to which the forces and movements in nature should be measured against. Absolute time just flows uniformly on without regard to anything external. (see 1905-Einstein re space-time) Among other matters, Principia also discussed tides, comets, the theory of limits and conical sections, orbits of planets and their satellites, the laws of curved motions, pendulums, and how to analyze wave motions. Principia also laid out four rules of reasoning

4 Rules of Reasoning, Induction

1. Accept the simplest valid explanation of an event. Ockham: The more complex an argument, the greater the chance for logical fallacies, rhetorical tricks, & reasonable seeming but unproven or false assumptions.

2. As far as possible, assign the same natural causes to the same natural effects i.e., respiration in humans and animals, stones in England or Iceland. That is, there is order in nature, “Uniformitarianism.”

3. Qualities of bodies in an experiment are to be considered the universal qualities of all bodies whatsoever. Also stating that there is order in nature. (All matter is affected by gravity, even light rays, as they are particles.)

4. Most important rule. Accept conclusions from Induction as accurate (or close to it) not withstanding any contrary hypothesis, until other observed facts / premises make them more accurate or liable to exception. That is, a mere hypothesis, however reasonable sounding, cannot discredit a conclusion based on the regularity of Nature and on observing and measuring phenomena which gives one good premises for a valid inductive conclusion.

Vatican ignored Principia 1687

Principia spread swiftly among the educated class (those who spoke Latin). Oxford and Cambridge were teaching it in less than 12 years. In a century, 18 editions of Principia were needed and 73 books were written about it, in English, French, Latin, German, Portuguese, & Italian. But Catholic universities did not teach it for over a century. Principia was the start & became the foundation of physics for 200 years, now known as classical physics, Machina mundi, the machine of the world, the universe is a giant mechanism that operates in orderly & predictable ways. But Newtonian physics did not however, fully explain what kept the universe running. That is left to the concept of energy.

Newton never used the term “energy” and died a century before Thomas Young proposed its use. (See Leibniz 1697) Newton’s stunningly simple Laws of Motion, gravity, and Rules for Reasoning validated mathematics and science as the key to understanding all existence. 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 inexorably in accordance with predetermined inviolable laws of nature. Newton applied the laws of dynamics to celestial bodies. Principia named errors of Descartes, Galileo, Kepler, Huygens, and Hooke. Principia said that the Cartesian notion of cosmological vortices led to a confusion of celestial motions.

1687 Aristotel and Descartes had advocated deducing scientific laws from valid universal accurate principles; Francis Bacon (1600) had advocated Induction. Newton combined the two, use Induction to reach general principles and then use deduction to reach further deductions that would be verified by precise measurement and observation. Newton hated hypotheses, explanations not directly supported by experiments.

Scientific Method

The Scientific Method has three characteristics: 1. Scientists are objective (or at least try to be).

2. Science deals with things, real and measurable, not “feelings,” “is” and “are,” not “should” and “if.”

3. Science advances through repeatable, verifiable experiments to prove / disprove a hypothesis.

The scientific revolution from Vesalius and Copernicus to Newton fundamentally and for all time transformed Man’s understanding of nature. The principles of the scientific method showed the error of some of Aristotle’s ideas (335 BC), which were based on logic and intuition rather than experiment and measurement as well as the errors of many phenomena that were Biblical statements about the natural world.
The scientific method did not of course spring fully developed in the 17th century. It developed slowly from, inter alia, Thales, Protagoras, Pythagoras, Aristotle, Hayyam, al-Razi, Averroes, Avicenna, Biruni, al-Haytham, Abelard, Roger Bacon, Albertus, Grosseteste, Francis Bacon, Mersenne, Galileo, Descartes, Boyle, Hooke, and Newton. The scientific method marked the end for divine explanations of natural events.

As noted (p 11), the scientific method differed from the thinking process used by the theologians. Theology starts with divine pronouncements & seeks arguments to support them. Science starts with facts / observations & tries piecemeal to find principles that connect them which can then be used to apply to other natural events so as to be able to predict. Science prevails as it can predict, & it can be verified. Heliocentrism supplanted geocentrism as it was more accurate & could & did predict new observations such as the phases of Venus. The scientific method was important to validate the new advances in science. Earlier knowledge had come from above, kings or gods. Francis Bacon, not a scientist, & Descartes were the two main codifiers of the new way of acquiring knowledge. The scientific method does not a priori rule out supernatural beliefs. It subjects them to the tests of adequate evidence, experiment, observation, verifiability, & falsifiability & such beliefs are thus verified or refuted.

New tools to measure

The second essential key to new discoveries in science was new measuring tools, thermometer (1592), microscope (1597), telescope (1608), barometer (1643), pendulum clock (1657), chronometer (1761). The telescope released the human imagination as no other implement had ever done. Modern Man takes order & measurement of the physical world for granted. It was not always so. Men learned to measure, explain, & manipulate natural phenomena in a way we consider scientific. While the Christian religions were fighting each other, Principia Mathematica established itself.

Newton’s universe was an eminently common-sense place, as science does not explain physical phenomena, it merely describes them. An explanation would give the purpose of a phenomenon. In science, there is no purpose.

Despite Principia, Newton, as a Unitarian (didn’t accept the Trinity), could not become a parson, & thus could not advance at Cambridge, mired in Anglican dogma, so he left. He became Master of the Mint in London & president of the Royal Society. He spent the rest of his life in politics (and privately in alchemy and the occult).

Newton wrote 1.6 million words on theology, the occult & alchemy. He thought the world was created in 3998 BC. He said the world would not end before 2060, based on his study of Bible codes. These writings have been rightly forgotten.

Science from c1680-c1730 was dominated by the ideas of Newton, and to a lesser extent, Leibniz (1697). Leibniz: “Newton robbed the deity of some of his most excellent attributes and sapped the foundation of natural religion.”

Five simple machines

The five simple machines, 1. lever, 2. wedge, 3. wheel/axle, 4. pulley, and 5. screw, were ancient, & had been modified, combined into more complicated machines, & improved over the centuries. But then, due to Newton, Descartes, Galileo, and others, men realized how machines did what they did, and began to see ways to make them do it better.

Euclid's Geometry was the important basis for much of the work of Western scientists, only well known in the West.

Dogma vs. reason

Belief in the truths of science is one of the key elements of modern thought. 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 and continues to be a rear guard action against the juggernaut of reason. Christians attacked Newton for “dethroning God.” Nevertheless, he was given a royal funeral in Westminster Abbey.

1687 The English Declaration of Indulgence granted religious freedom to all, legalized not attending the Anglican Mass.

1688 Nicolas Malebranche (1638-1715), French priest, re the Problem of Evil, said God could have created a perfect world but didn’t, in order to get the best balance between perfection and the simplicity and generality of its laws.

1688+ John Locke (1632-1704) & the English “Glorious Revolution” of 1688. Locke was the most influential English philosopher, founder of philosophical liberalism as much as of empiricism, and in the theory of knowledge.

William of Orange, Dutch, Protestant, and his English wife Mary, were invited to the throne. (Charles 1 had been executed in 1649 and other kings hadn’t worked out.) William took over by invitation, without a fight, thus “Glorious.”

Property is sacred

Locke, in exile living in Holland as Vand de Linden, came back to England on the same ship as Mary with his two Treatises on Civil Government, in the second of which, Of Civil Government, he discussed three great ideas, property, government, & revolution. The Treatises - published anonymously - were written to justify the “Glorious” Revolution. He accepted Hobbes’s 1651 idea of a social contract between a governor and the governed. “Where law ends, tyranny begins.” Said, “In a state of nature all men are free and equal; no man is by nature sovereign over other men.”

1690 Locke argued that men had “natural rights,” life, liberty, and property (Slaves were property). There is a right to property, but only within reason. Government is justified as a way to protect property. As such, the state should play no part in matters of belief or conscience. So property is legitimate, so is government. Authority derives solely from the consent of the governed. Governors must govern for the good of the people, who then consent to be governed.

The duty to revolt

The people can & should revolt & change their government when the governor becomes a tyrant. Government is to serve people, not impose ideas on them. Never before had revolution been based on a general notion of property
rights. Thus, deposing kings and revolution was now based on rights to property. Powerful concepts. Separation of powers prevented tyranny. Profits weren’t taxed, only imports & consumption. He was an acquaintance of Newton.

**1690**  
**Great Chain of Being.**  
*Locke* venerated property as the product of one’s labor. In the state of nature all men are free and have equal rights. Man acquires as his property the products of his labor [or inherits it]. (Land reformers in the 1900s also distinguished between property that was the fruit of one’s labor and land that should belong to the people.). He felt that the protection of property was the same as the promotion of the common good. (Owners of property have duties as well as rights. *Thomas Drummond* 1838) *Locke* saw a great Chain of Being, Man at the top, created by God.

**Man’s mind at birth is a blank slate, a “tabula rasa.”**

*How we think:* **Locke’s theory of knowledge:** *Locke* stressed studying how we know things. Contrary to Descartes’s theory of Man’s mind at birth, he believed that the human mind was a blank slate upon which would be written all Man’s experiences, giving rise to knowledge which is perfected by reflection. So our social environment shapes our beliefs, actions, and knowledge. So, improve the environment, improve the person. He felt that changes in the environment changed people. *Locke* eventually conceded that the 5 senses and the ability to reason were innate.

*Locke* took a new interest in applying scientific insights to society. So he advocated more wide-spread education. Thus 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.

*Locke* did not particularly like democracy, but he was the theoretical architect of what we call democracy, as he posited certain basic liberal ideals, like all men have equal natural rights, specific principles, such as majority rule and checks and balances between different parts of the government (originally a Greek concept). *Locke* was offended by Oxford and Cambridge’s teaching of scholasticism. *Locke* came to inherit Cromwell’s supporters. Looking at the forests of America, he said, “In the beginning, the whole world was like America.”

*Descartes* influenced *Locke.* *Locke* said, “The bare testimony of revelation is the highest certainty.” but also, “Revelation must be judged by reason.” So reason in the end rules. Of reason, he did not limit it 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* was eloquent in advocating that religious differences had to change. He disputed Luther’s harsh edicts His Essay Concerning Toleration was the first major presentation of the empirical theory of knowledge. “God is tolerant, you don’t have to kill other faiths.” He said that toleration of other faiths is the only true Christianity. This was contrary to the Church’s commands to torture & kill “heretics” in inquisitions, crusades & the bloody Wars of Religion. The devastation of Europe likely would not have occurred but for the corruption and greed of the Church in Rome..

*Locke’s “toleration” was however, severely limited.* He said that atheism & Catholicism should be legislated against as inimical to religion & the state. He said atheists had no reason to act morally. Catholics in England and Ireland had practically no religious, political or civil rights. Plus, Women & poor people should not be citizens.

The 1689 Toleration Act gave a few rights to non-Anglicans, but not to Catholics, atheists, non-Trinitarians, Dissenters.

*Locke’s Essay Concerning Human Understanding,* a critical assessment of human reason, dealt with the origin, extent, and certainty of science. Said, “New opinions are always suspected, and usually opposed, without any other reason but because they are not already common.” *Locke* argued against Plato, Descartes, and the scholastics, who had said that the mind had innate ideas or principles. In Essay, 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.” & “No man’s knowledge...can go beyond his experience.”

For *Locke,* God had harmonized the physical & moral worlds. As moral knowledge (like all knowledge) was learned by experience, so the true & enduring causes of enduring human happiness, & thus of virtue, were identical to virtue. Oxford condemned it. Echoing Principia, *Locke* thought there were natural laws that applied to humans & their governance. “Man hath by nature a power...to preserve his property - that is, his life, liberty, & estate - against the injuries & attempts by other men.” *Locke & Newton* gave England undisputed intellectual leadership of the world from c1680 to c1730. *Locke* showed how experience generates truth. Talk about the soul was replaced by talk of the mind.

**1690**  
**Huygens** (ref. 1656) had developed a wave theory of light in 1678 & wrote Treatise on Light, but it wasn’t published until 1690. As it was opposed to Newton’s particle / corpuscular theory, it was largely discounted. The wave theory explained both reflection & refraction & in time became the more accepted theory. Franklin & Euler accepted it.

**1691**  
**Biology:** John Ray, Brit., *Wisdom of God Manifested in the Works of Creation,* rigidly fixed the immutability concept.

**1694**  
**Botany:** Rudolph Camerarius, German physicist, wrote Ueber das geschlecht der pflanzen said plants reproduced sexually with the stamen and pistil as the male and female organs and pollen as the fertilizing agent.

**1696**  
**Dogma vs. reason:** *Thomas Aikenhead,* Scot, 20, theology student, ridiculed Christianity. The Presbyterians tried and
hanged him for blasphemy. From 1641-1693, Puritans in Massachusetts had tried & murdered 36 alleged witches. The Scottish Parliament required schools in every parish, to enable children to read the Bible. Literacy exploded.

1696 Bayle (ref. 1680 & 1685) wrote the *Historical and Critical Dictionary* to demolish the “vices of religion.” It was the most popular book in the 18th century. It ridiculed the Bible and way outsold Locke and Voltaire. Voltaire called him the “greatest master of the art of reasoning.” Writers quoted its arguments for atheism so often it was called the “arsenal of the Enlightenment.” For every page of text, there were 20 pages of footnotes, which themselves had footnotes.

1697 Baron Gottfried Wilhelm von Leibniz (1646-1716), great 17th century continental rationalist. He had discovered calculus at the same time as Newton. His *On the Ultimate Origin of the Universe* asked why there should be any world at all. Leibniz wrote in Latin or French, not German (more Leibniz 1710, 1714)

1700 18th Cent. Background: Christians, waiting for fulfilment in another life, largely ignored seeking knowledge in this life, lived in intellectual limbo. Then came new discoveries in science, the *Age of Reason/Enlightenment*, growing out of the *Renaissance*: The giants of the 17th century had established a climate of opinion that there was *Order in Nature*.

Knowledge became secular

Dogma vs. dogma: The wars of religion had left Europeans disgusted with religious extremism. Due largely to Newton, the 18th century became the age of science. Newton’s thinking permeated all scientific as well as social thought. Reason reflected the time’s spirit, when men left their self-caused puérility & could be moral not just because they feared God. It could also be termed an *Age of Optimism*, marked by new confidence in one’s mind, in science and reason.

Science became the model for knowledge. It was also an age of revolutions. Men of *The Enlightenment*, sought to extend scientific methods & forms of knowledge to social & political life and to religion itself. The two main schools of philosophy were *empiricism*, knowledge comes from experience, & *rationalism* (knowledge comes from reasoning). Both approaches rejected any supernatural causes. Morals & social thought became more & more secular.

Science changed the philosophical outlook but not society itself. The rational spirit of the *Enlightenment* undermined all bases for a Christian God & scriptural authority. Knowledge became scientific knowledge, not theological. The sciences continued to divide & specialize. Scientific theories proliferated, most to be discarded as better theories proved themselves. *Enlightenment men* had confidence that they or their successors could solve Man’s problems. Almost any 18th century Western thinker was radically critical of organized Christianity, Catholic or Protestant. 18th century anti-clerical, anti-monarchy social critics, *philosophes*, like Diderot, Montesquieu, d’Holbach, Voltaire, and Bayle, questioned authority, i.e., Aristotle, the Bible, and favored a purely rational religion, and carried out a moral crusade against intolerance, tyranny, and superstition. They wanted to change the world through science. *Philosophes* believed foremost in the power of reason and in knowledge, against the prevailing religious and political dogmas.

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. “BC” began to be used in the 1700s to designate years before Jesus.

Europe dominated: From 1700 to 1850, Europeans conquered and colonized and exploited the Americas, Australia, Africa, Siberia, India, the Mid-East. China and Japan felt no need to change their ways & remained isolated, stagnated.

c1700 Physics: Guillaume Amontons (1663-1705) French, developing an air thermometer, saw that different masses of air expanded the same fraction of their volume at fixed temperature increases. He posited an absolute zero temperature.

c1702 Dogma vs. reason: Bishop Bossuet of Meaux, a foremost theologian, said heliocentrism was contrary to Scripture.

c1703 Czar Peter the Great (1672-1725), forcibly modernized Russia. built St. Petersburg, his grand new capital. 200,000 workers died from cold & 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, 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 to the Caspian, exported minerals and lumber. Most Russians, the serfs and some nobles remained illiterate. Russia was the last European country to abolish serfdom. Peter had his son, Alexis, suspected of plotting a coup, killed.

1704 Newton published *Opticks* in English, written mostly in 1675, but not published to spite Hooke. *Opticks* said the speed of light is finite, & light takes c8 minutes to get from the Sun (actual 8.2 minutes). He was knighted in 1705.

1704 Jonathan Swift (1667-1745), dean of St. Patrick’s Anglican Cathedral in Dublin, *The Tale of a Tub*, an allegorical satire ridiculed the bigotry of warring religions, the pedantry of dishonest critics, & similar targets. (More Swift at 1726)

1705 Astronomy: Halley predicted that the comets seen in 1531 and 1607 were the same comet as 1682’s, with a 76 year orbit, said comets have regular orbits, and predicted it would return in 1758. It did. It was then named Halley’s comet.
God OK?
suffering
Problem
morality.
dele-
evil and
They all
Energy

Leibniz (1697) invented the binary system, wherein all numbers are written using just 0 & 1. To Leibniz, 0 and 1 stood for nothingness and 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 “energy.”

Energy is not generated; it is transformed

Leibniz published Essais de theodicie sur la bonté de Dieu, la liberté de l’homme et l’origine du mal / Theodicie Essay on the Benevolence of God, the Free Will of Man, & the Origin of Evil. He coined the word theodicy to mean justifications for the evil & suffering in the world to defeat the premise of the Problem of Evil that a loving omnipotent God would prevent unnecessary evils & sufferings. Theodicies purport to use reason while theologies purport to use revelation & faith. The basic theory of theodicies is that God has a morally sufficient reason to permit evil. The truths of philosophy and theology cannot contradict each other. Leibniz proposed several theodicies, some closely related. God, being omniscient, loving, and omnipotent, had to and did create the best possible world, even though it contained some evil and suffering. All possible worlds contain some evil.
Theodicies seek to justify evil and suffering

Free Will Defense: God gave Man free will even to sin. So the best world was one with the most possible good in light of the inevitable occasional evil.
Greater Good Defense: God permits some evils as necessary to provide some greater good. The evil permitted must of course be the minimum necessary to achieve the good. [Anglican philosopher Richard Swinburne, eminent professor-emeritus of philosophy at Oxford, argued that the Holocaust gave Jews a wonderful opportunity to be courageous & noble. (Swinburne says he didn’t mean to justify Nazis, just to justify God’s non intervention.)
Unknown Purpose Defense, Man is too Dumb Defense: “Evils we see are really goods to the universe. They are only evil to Man’s narrow human perspective.” There aren’t any real evils, only apparent evils. [However, simply saying God is good implies that Man can distinguish good from evil. Saying Man can’t contradicts this premise.]

Another proposed theodicy: As the truths of philosophy and theology cannot contradict each other, some evil & suffering, is unavoidable in any creature less perfect than its creator.” Another: Evil improves the good by contrast.

Another: Moral and physical evil add to the overall perfection of the world and hence are not genuinely evil. Several other theodicies based on the idea that Man is too dumb or ignorant to understand God’s overall goodness which contained merely “apparent” evils. (Hume responded in 1751 and 1779)

What won’t God OK?

A theodicy doesn’t try to prove the existence of God, it only tries to defeat the Problem of Evil by justifying evil.
If God could justify all the evils & sufferings that have plagued Mankind, which He must have, what won’t He OK?

1709 Religion: George Berkeley (1685-1753) Anglican bishop argued that nothing exists unless it is perceived / Esse est percipii...Only minds could be proven to exist. Material objects are just ideas in God’s mind. Samuel Johnson kicked a stone & said, “I refute it thus.” Ridicule forced Berkeley to say God watched everything, so things exist after all. Evil & suffering, “inconveniences” to Berkeley, are due to nature, under God, conforming to the “most simple general rules.”

Leibniz also posited four arguments for the existence of the proposed Western Abrahamic God. One is ontological, the second is cosmological (just below), the third is the argument from eternal truths (certain statements are always true, eternal, and can only exist in the mind of God), and the fourth is the Argument from Pre-established Harmony (akin to the Design Argument i.e., the entire universe was one large system expressing God’s plan). God’s foreknowledge 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) and ending with God (whose mind is infinite.) Man is between these extremes. Ideas rule Man’s mind. The universe is the set of all finite minds that God has created.

In The Principles of Nature & Grace, Based on Reason, Leibniz asked, “Why is there something rather than nothing?” A reasonable question. His Cosmological answer, things must have a cause (his Principle of Sufficient Reason). We can’t explain why matter exists. So something beyond our reason must be the cause. It must be God. For him, the
Christian God. There has to be a sufficient reason for anything, including the universe to exist. Plato, Aristotle, Averroës, al-Ghazali, & Aquinas all had made similar, not identical, cosmological arguments. (This argument resonates with man’s common sense. In the 20th century, quantum mechanics destroyed common sense.)

Leibniz also created the great analogy of the Cartesian clocks, which postulated that mind and body do not interact, but only seem to, as they are synchronized by God. (Analogies compare a complex concept to a familiar concept to help understand the complex concept. Examples: They are as alike as twins, they’re like peas in a pod.)

Energy Leibniz vs. Newton: Newton, when two identical objects collide head on, their energy disappears. Leibniz, when two identical objects collide head on, their energy remains and goes for example into heating up the objects. Leibniz was right, the Law of Conservation of Energy was later superseded by Einstein’s Law of Conservation of Mass-Energy.

1714 After disasters in the British fleet, the Board of Longitude offered £20,000 for a method to calculate longitude.

1715 Physics: Daniel Gabriel Fahrenheit, Dutch, made an accurate thermometer measuring the expansion of mercury.

1719 A popular compendium of doubt, The Life and Spirit of Spinoza, was published anonymously. It was later reprinted under the title, The Three Imposters. [Moses, Jesus, and Muhammad]. Its author is unknown. It reprinted and adapted arguments of Pomponazzi, Spinoza, Averroes, Vanini, Hobbes, Charron, and others.

1721 Political Theory: Charles-Louis de Secondat, Baron de Montesquieu (1689-1755), lawyer, man of letters, became famous when he published, anonymously, Persian Letters, which wittily ridiculed the French monarchy (more 1748).

1724 Bishop Joseph Butler, confessor to the queen, published 15 Sermons on Human Nature wherein he argued that God had given Man a distinct human nature—regarding moral sense—and a desire for happiness. And he would act accordingly. So for Locke and Butler, acting impulsively did not lead to happiness, acting lovingly did.

1725 Francis Hutcheson (1694-1746), an Ulster Scot, a founder of the Scottish Enlightenment, Chair of Moral philosophy at Glasgow, taught philosophy first at Dublin, then Glasgow. In Inquiry Concerning Moral Good and Evil, he was the first to use the phrase “greatest happiness for the greatest numbers,” which came to be the basis for Utilitarianism.

He and Henry Home / Lord Kames (see 1734) revolutionized the Scottish intellect, created a new understanding of human nature and society. He sought to refuse Hobbes’s materialistic selfish, vicious view of Man. Said morality was from God. 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 merge in his System of Moral Philosophy.

The Scottish Enlightenment was as influential as the French Enlightenment. It presented Man as the product of history, its great discovery was that Man is a creature of his environment. It transformed every branch of learning. It created the Encyclopedia Britannica in 1768. It broke from rigid Presbyterianism but sought to liberalize and humanize the church, not reject it as the French philosophes rejected the Catholic Church. The Enlightenment spread slowly to American elites.

1726 Swift (ref 1704), supported the Irish struggle for freedom from England, wrote Gulliver’s Travels, where men were not rational, only beasts capable of reason. His 1729 satire, A Modest Proposal, described the atrocious condition of the Irish poor & proposed that they sell their children to their British landlords to eat. One benefit, it would reduce the number of Catholics. Said, We have just enough religion to make us hate, but not enough to make us love one another.

1729 Physics: James Bradley said light travels 301,000 km/sec. (only .4% high) & that the Earth’s motion distorts starlight.

1730 Matthew Tindal, England’s most influential deist, in Christianity as Old as Creation (known as the deists’ bible), said God made the universally laws of nature, including pursuing pleasure and avoiding pain, as the sole moral nexus between Man & God. “It invariably follows, nothing can be part of divine law but what tends to promote the common interest and happiness of [Man].” The logical implication of this was that Christianity added nothing not knowable by studying nature. All particular dogmas were unverified nonsense. The House of Commons had the book burned.

The French philosophes came to see that the Catholic Church was the deepest foe to their attempts to reform society. Most philosophes were atheists or deists who believed that God spoke to Man through nature alone.

1731 Electricity: Electric shocks from fish and static electricity (a + or - charged body), were known in ancient times. Stephen Gray, Brit, saw static electricity, a very weak charge, could be made to flow along a conductor, so a current.

1733 Philosophy: Alexander Pope (1688-1744), Brit, a deist, “Know then thyself, presume not God to scan. The proper study of mankind is Man.” (In 1711, “A little learning is a dangerous thing. Drink deep, or taste not the Pierian spring.”

1733 Voltaire, pen name of Francois Marie Arouet (1694-1778), historian, philosopher, supreme debunker of hypocrisy, most famous rationalist, a major figure of the Enlightenment. Jesuit-educated, defended victims of religious intolerance. He wrote voluminously, some anonymously. He was imprisoned, exiled, and/or hounded into seclusion several times.
Emanuel Swedenborg theorized that all matter is ultimately composed of dimensionless points of total & pure motion. He suggested the nebular theory of the development of stars and planets, later developed by Kant and Laplace.

Henry Home (1696-1782) Scot, said laws were made to protect property; races came from separate stocks... The law is a living thing, being founded on experience & common sense. Reason & the laws of human nature (varying as conditions change) were the basic principles of law. A sense of property was the start for all social arrangements. Man is disposed by nature to appropriate. He organized history into 4 stages, 1. hunting & fishing, 2. herding, 3. agriculture (when communal cooperation requires laws and a governing structure), & 4. towns, which needs more laws to regulate all the new interactions among people. "Without private property there would be no industry, and without industry, men would remain savages forever." Named a judge in 1752, thus became a law lord, Lord Kames (See also 1777)

Physicist: George Hadley (1685-1768), Brit., suggested that warm air rising over the equator moved to the poles in the upper air before cooling and sinking, identifying a circulation pattern, now known as the Hadley cell.

Linnaeus (1709-1749), Voltaire's mistress, brilliant French nobliewoman, founded a laboratory where she & visiting scientists studied energy. Chatelet liked Leibniz's concept that the kinetic energy of an object was its mass times its velocity squared, KE = mv², not Newton's idea that kinetic energy was just mass X velocity, KE = mv. Wilhelm 's Gravesande dropped a weight at different heights into soft clay. The weights penetrated the soft clay proportional to the square of their velocities, KE = mv². Leibniz's theory. Chatelet published her findings. English physicists stuck with Newton. Germans favored Leibniz's. In 1820, it was decided the correct formula was KE = ½ mv² (1820 kinetic)

Math: Leonhard Euler (1707-1783), Swiss. One of the most prolific mathematicians, made important finds in all fields of math, including solving the formidable 3-body problem, i.e., the relative movements of the Earth, Moon, & Sun. He created Differential Calculus practically single-handedly. His Mechanics recast Principia Mathematica into explicit analysis, bringing to bear the full power of calculus. He did much to fuse Newtonian and Leibnizian math.

Frederick 2 / Frederick the Great of Prussia (1712-1786), "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, every man must be saved in his own way." Frederick welcomed Voltaire, philosophes, Muslims, Jews, & Jesuits to Prussia.

Philosophy: David Hume, (1711-1776) Edinburgh, born poor, entered U of Edinburgh at 12, lawyer, Tory, diplomat, deist, generally regarded as the most important philosopher to write in the English language. He explained, "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 establish'd. After much Study, & 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, & made me, with an Ardor natural to young men, throw up every other Pleasure or Business to apply entirely to it." He published his first book, A Treatise of Human Nature, anonymously, in 1739, begun at age 18.

Since Thales, Western natural philosophers (not the clergy) had said reason should guide human actions. Hume destroyed that; said, "Reason is, & 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, lust, anger, fear. He said that the psychological basis of religion is fear of the unknown. He argued that human instincts & emotions were more important than human reason, that every opinion & value judgment was based, not on reason
but on passion (pleasure or pain), a mixture of instincts, feelings, & emotions. Said, All of our knowledge comes from impressions and ideas. Impressions are more forceful and lively than ideas. He considered himself a skeptic.

He took Locke's empirical arguments to their logical conclusion (which Locke had not) & ended by doubting our ability to know anything at all except that which one learns with his senses. Thus, he denied god, the self, the objective existence of logical necessity. “When I hear a man is religious, I conclude that he is a rascal, although I have known some instances of very good men being religious. No concept, not space, time, substance, causality or any other mental category - comes before experience. Memory & imagination preserve & arrange our ideas. We have good reason to be skeptical of all conclusions reached by the use of reason. All knowledge resolves itself into probability.”

So Hume rejected induction, for unless the premises were certain, the conclusion could not be certain thing, perhaps a very high probability, even enough to act on, practical certainty, but not 100%. This hit at the heart of rationalism.

1739 **Hume's A Treatise of Human Nature** was meant to help establish a science to provide a rational moral code. He said that all our knowledge comes from expressions and ideas. “Knowledge cannot go beyond experience.” (like Aristotle and Locke) Impressions are more forceful than ideas. Thus one cannot have any knowledge of causality. **Treatise** criticized the view that causation is an objective productive relation between two things & the Causal Principle, i.e., that every contingent being has a cause of its being, which is the basis of one of the Cosmological Arguments.

How we think: “What we call causality is simply our habit of associating two events because we see them together.” “What we call a mind is nothing but a heap or collection of different perceptions, united together by certain relations, and supposed, though falsely, to be endowed with a perfect simplicity and identity.” He deflated metaphysical pretensions, made philosophers very nervous about their assumptions.

Epistemology: The logical outcome of Hume's empiricism was that there could not be any scientific knowledge, which leads to philosophical skepticism. But, science is built on causality and inductive inference 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 at least Bacon, natural philosophers had used induction simply on the grounds that it works, it advances knowledge, even if imperfectly.

In 1741, 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 was probably the first to use the phrase “a government of laws, not of Man.” John Adams put it in the Massachusetts Constitution. (more Hume 1748, '51, '79)

1740 Muhammad ibn al-Wahhab founded an extreme Muslim sect, Wahhabism. Ibn Saud agreed to enforce it for his political support. When Saudis took over Arabia in 1744 they enforced Wahhabism. Saudis razed Sufi sacred sites.

1740 **Political Theory**: **Ethics: Hutcheson** (ref 1725) asserted the right of people to resist (revolt) when their fundamental rights were infringed. (From Locke 1688). The Kirk / Presbyterian establishment disapproved, as the idea of “natural” morality downplayed the importance of the 10 Commandments. He may have been the first to teach in English.

1745 **Physics, Electricity**: Pieter van Musschenbroek, Dutch, invented the Leyden jar, a device that could store electricity.

1746 **Physics; Euler's Nova theoria lucis et colorum** said diffraction of light is better explained by the wave theory than Newton's particles / corpuscular theory. Euler's First Law, the linear momentum of a body is its mass times velocity. Euler's 2nd law, the rate of change of angular momentum is the sum of the external moments of force about its axis

1747 **Materialism**: Julien de La Mettrie (1709-1751) French doctor and 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.

1747 **Physics, Electricity**: William Watson (1715-1767) Brit., saw that a discharge of static electricity caused an electric current to flow, developed the concept of an electrical potential / strength (voltage). (see Electromagnetism, p. 123)

1748 **Political Theory**: Montesquieu (ref.1721), his most influential work, The Spirit of the Laws, said law in general is human reason. He sought to find the laws of social conduct, like laws of nature. He said that geography, climate, customs, living conditions, & habits all play a role in the laws of a nation. Disrespect for women has invariably been the surest sign of moral corruption. Most famous for advocating the separation of powers. This influenced Jefferson & other American elites. France’s absolute monarchy had so undermined France’s constitution that liberty was not possible.

**Political Theory**: The idea of Europe as a culture / civilization apart from Christendom emerged in the 18th century.

1748 **Hume's Essay on Miracles**: “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 are, of course, needed for Catholic sainthood.] Essay on Miracles answered the Argument From Miracles / Religious Experience (I saw / spoke-to God). “Is this evidence of God or merely evidence of someone’s
Romantic Evolution

Problem of Evil

There are only 3 types of statements

Hume’s Enquiry Concerning Human Understanding argued that the only meaningful statements are statements of fact and statements of the relation of ideas. He said every statement is either 1. True or false by definition, i.e., logically necessary assertions (i.e., 2+2=4, a spaniel is a dog) & its negation must be false. To say a spaniel is a dog simply restates the definition of a dog. It tells one nothing new. Or 2. Contingent assertions, those dependent on experience / experiment / facts. Such contingent assertions may be true, but their negations are not necessarily false (i.e., X is a doctor. They say something meaningful / illuminating about the world). 3. All other statements are nonsense, useless.

To Hume, most statements in theology were neither necessarily true nor dependent on provable facts, thus nonsense. They tell one nothing. For example, the statement “God exists.” is neither type 1 necessarily true (as its denial isn’t necessarily false) nor type 2, contingent, empirical (as we don’t experience God with our senses); so it’s nonsense, beyond the bounds of knowledge. His empiricism made all experience contingent, that is, may or may not be true.

Theology: Hume phrased the Problem of Evil as, “Is God willing to prevent evil but unable to do so? Then he is not omnipotent. Is God able to prevent evil but unwilling to do so? Then he is malevolent. If God is both willing & able to prevent evil, then why is there evil in the world?” He said that the world was so full of hardships & dangers it couldn’t have been created by an omniscient & omnipotent entity. Hume’s Enquiry also developed the Problem of Contrariety (p.178), that contrary statements of different religions are mutually exclusive & thus, at most, only one such statement could possibly be true. This is just the second basic law of thought. (See God, Arguments against, in the Index)

Geology. Biology. Evolution: Georges LeClerc, Compte de Buffon (1707-1788), French, wrote Historie Naturalle, . 44 volumes. Volume 1 posed an evolutionary origin for the Earth, a molten ball that cooled, similar to ideas of Kant (1755) and English geologists. Fossils were evidence of animal and extinct species. He suggested there was a common ancestor for Man, apes, and quadrupeds that was different from animals of the day. Useless organs (like the appendix) showed change had taken place. He felt the Earth could be 35,000 years old. This was the first Western history of life and the Earth not based on the Bible. The study of geology shattered the Bible’s chronology of the world.

Catholic Sorbonne theologians forced Buffon to recant, to say, “I declare that I had no intention to contradict the text of Scriptures; that 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 respecting the formation of the Earth, and generally all which may be contrary to the narrative of Moses.”

In 1778, he wrote that the Earth was at least 75,000 years old. Sorbonne theologians again forced him to recant. Ernst Mayr, “Buffon was not an evolutionary biologist, yet he was the father of evolution. He was the first person to discuss a large number of evolutionary problems, that before him had not been raised by anybody.”

Dogma vs. reason: John Wesley (1703-1791), a pious Anglican priest, influenced by Imitation of Christ, opposed Calvin’s predestination. He was shut out of Anglican churches so, like Jesus, he preached in fields & wherever he could find an audience, gradually gained many followers. He authorized lay preachers to spread his ideas, heavy on social justice. An abolitionist, he founded chapels, eventually sending missionaries to America. While he thought himself an Anglican, his movement became the Methodist Church. A fervent believer in the Bible, his sermon The Causes & Cures of Earthquakes, said that earthquakes & carnivorous animals were caused by Adam’s Original Sin.

Psychology: The Western concept of romantic love, first sung by troubadours in the twelfth century, became widely accepted by the Western middle class, but never spread beyond the West. Hindus, Chinese, Malaysians, Koreans, Japanese have no name for it. The East has desire, affection & recipes for physical pleasure (Kama Sutra), & family attachments, but not the moral anxieties, ideal passions, guilt feelings, nostalgia, & obsessions in Western novels, operas, & tragedies. For many, romantic love is real and wonderful, but it can fade. George Sand 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.” Margaret Mead

Political Theory, the rise of nationalism: Hans Kohn (1891-1971), asserted that modern nationalism is not older than around 1750. Previous “nations” were but family conquered lands. “Nationalism, taking the place of religion, is as diversified in its manifestations & aspirations, in its form & even its substance as religion itself...Yet in all its diversities it fulfills one great task - giving meaning to Man’s life & justifying his noble & ignoble passions before himself & history, lifting him above the loneliness & futilities of his days, & endowing the order & power of government, without which no
society can exist, with the majesty of true authority.” Many things of course give meaning to people’s lives. Francis Fukuyama, 3 conditions are needed for a modern state, a stable & accountable government & the rule of law.

No emotion unifies a group so readily as hatred for a common enemy. England, Germany, France, Spain, Holland, Italy, Switzerland, the U.S., Austria, Sweden, Denmark, all attained unity by virtue of resistance to foreign enemies. Nationalism shares with religions a great fear of & hatred for dissent, & so rulers prosecute dissent ruthlessly. All Europeans took the subjugation of darker skinned peoples, Indians, Africans, Amerindians, Malay, as legitimate.

Balance of Power: The Western state system rested on state sovereignty, international law, & the politics of the balance of power, if any one state becomes so strong it endangers other states, the other states will join to stop it.

Electricity. Benjamin Franklin published Experiments & Observations on Electricity; widely read in America & Europe. He invented bifocals & the lightning rod. The French built them. They worked. Lightning rods became common. In 1752, he flew a kite in a thunderstorm, proved lightning was electricity. Franklin showed objects carry equal numbers of positive & negative charges, showed electricity can magnetize forces of attraction & repulsion between two charged bodies. He showed that a conductor can draw an electric charge from a charged body & that an electric charge can produce magnetism.

He was elected to the Royal Society in 1756 for his experiments with electricity. (He also invented the energy efficient Franklin stove, was the first US post master (as owner of the Pennsylvania Gazette, he banned other papers from using the mails). He deduced the existence of the Gulf Stream. From 1732-1758, he printed the popular Poor Richard’s Almanack, which spread household hints, puzzles, proverbs, weather information, common aphorisms, & ethical values, “Early to bed, early to rise...time is money...lost time is never found again...They that give up essential liberty to obtain a little temporary safety deserve neither liberty nor safety. Other sayings were exceedingly trite.

Ethics. Hume (ref 1739) published An Inquiry Concerning the Principles of Morals. He argued that the purpose of ethical inquiry is to discover those universal principles on which moral praise and blame are 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. Regarding the Problem of Evil, Leibniz had written in Thoedicies (1710) that “Apparent evils are only evil according to Man’s narrow human perspective.” (i.e., Man is too dumb to know a real evil.)

Hume replied,”All theodicies have in common 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? Hume, If one holds, as a matter of ethics, that there should be no unnecessary suffering, the Problem of Evil refutes traditional theism.” [It was Man’s “narrow human perspective” that said God is good in the first place.]

Free Will Defense to the Problem of Evil. Irenaeus (ref AD 177), Leibniz, and Plantinga (1974) advanced The Free Will Defense to the Problem of Evil. Namely: Evil exists as God gave Man free will, and God will not or does not even intervene when Man does evil as that would negate free will. Free will makes Man responsible for his actions. This argument supports a judicial ideal of retributive justice.

The Free Will Defense must thus assume 1. that every act of free will, in and of itself, is worth more than any possible unnecessary or gratuitous evil or suffering its exercise may cause, and, 2. that God couldn’t create Man limited to non-evil actions. i.e., with free will to do anything except for instances when Man wished to cause suffering, (Similarly, Mackie’s 1955 alternative, make humans so moral they wouldn’t freely choose evil.) Assumption 1. is refuted by experience (the holocaust, Pol Pot). Assumption 2 makes God not omnipotent (He can’t do it?), and thus not the concept of the Abrahamic “perfect” God. The Bible & Koran nowhere say that God justified evil with a free will argument.

Hume said the Free Will Defense was limited, illogical, and mis-stated history. Specifically:

1. It applies only to the evil & suffering wilfully inflicted by Man on Man, like slavery, murder, subjugation of women, so-called moral evils. But there are other evils, natural evils [famine, tsunamis, forest fires, blight, diseases, earthquakes, SID, deformities, plagues, autism, insanity, mental illnesses, flu etc.] that afflict mankind, are called “Acts of God.”

It’s not logical

2. Whenever someone does evil to another, there are two free wills involved, the evil-doer’s and the victim’s. God’s non-intervention means God chooses the free will of the evil doer over the free will of the victim. God preferred the free will of the Nazis over the free wills of Jews who wanted to live. Erasmus, “He who allows oppression shares the crime,” Archbishop Tutu, “If you are neutral in situations of injustice, you have chosen the side of the oppressor.”

It’s bad history

3. It mis-stated history. The Bible says God does intervene. God delivered manna, loaves, fishes to Jews in the desert. He parted the Red Sea. He gave the Ten Commandments. So God intervened to prevent suffering. Would it really detract from man’s free will if God abolished cancer, disease, deafness, blindness, mental disease, imbecility?

Holiness Problem

Another Leibniz theodicy: God permitted some evil in the world in order to create a better world. God’s will regarding good in the universe is decretory (positive), but God’s will re evils is merely permissive; & 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. This is known as the “Holiness Problem” of the Problem of Evil.
Hume’s answer. If the evil 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. If somebody else (Satan) created evil, how can one know that God and not Satan created the universe? 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.”

The tendencies of theism that most concerned Hume were its intolerance & opposition to liberty, its distorted moral standard & its willingness to sanction great crimes in the name of piety & devotion, doing evil in the name of God. Politically, Hume favored separation of powers (like Locke & Montesquieu), voting (albeit only by persons of property), limiting the power of the clergy, decentralization, annual elections, & unpaid representatives. He preferred a monarchy to a republic. Hume said, “Epicurus’s question [Why is there evil?] is yet unanswered.”

Hume said Caucasians were superior to all other races. “I...suspect that the Negroes to be naturally inferior to the whites...There ever was a civilized nation of that complexion, or even any individual eminent either in action or speculation.” Also, “Generally speaking, the errors in religion are dangerous; those in philosophy only ridiculous.”

1751-1752

**Encyclopédie, Dictionnaire Raisonne des Sciences, des Arts, et de Metiers:** Denis Diderot, its editor, and Jean Baptiste le Rond d’Alembert founded the Encyclopédie, a vast project, with over 160 authors and perhaps 100 more consultants. It was a compendium of the new scientific thinking, and the flagship publication of the Enlightenment, critical of both religion and the legitimacy of France’s monarchical despotism. They, with Voltaire, Rousseau, and d’Holbach (1761), were the guiding spirits of the *Enlightenment*, centered in Scotland and Paris.

The Enlightenment was explicitly Lockean in that it was based on the idea that all knowledge came from real world experience, not scripture. Like many philosophes, Diderot disdained Jews. Diderot 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), & “Islam is the enemy of reason.” In the English speaking world, the quarterly *Edinburgh Review* was the most read, most influential journal. Scots Hume, Adam Smith, Hutton, and Ferguson became the first intellectual celebrities of the modern world.

1753

**Voltaire’s Historie universelle** said China was the first great civilization, with silk, paper, porcelain, clocks, gunpowder, minted money, printing, and distance navigation 1000 years before Christ. He attributed China’s stagnation, and thus its relative decline vis-a-vis Europe to the complexity of its written language (a reasonable and widespread opinion now) and its excessive reverence for tradition.

1754

Anglican Bishop Thomas Newton described many Christian practices taken from Paganism, like incense, sprinkling holy water, lighting many candles. “Is not the worship of saints & angels the same as the former worship of demons? The name only is different. The thing is identically the same.” He described all the pagan practices the Church used.

1754

**Philosophy:** Jean Jacques Rousseau (1712-1778), sparked the Romantic Movement’s reaction to materialistic reason. Go back to nature to cure society’s ills. His *Discourse on the Origins of the Inequality of Mankind* argued that people had adopted laws and government to preserve their private property (a social contract), but that in the process they had become enslaved by government. “To be sane in a world of madmen is itself a kind of madness.” (More at 1762)

1755

**Chemistry:** Joseph Black, Scot, deduced air was made up of different gasses. First to isolate pure CO2 and nitrogen.

1755+

**Samuel Johnson** (1709-1784) published the *Dictionary of the English Language*. It standardized English spellings. “The caustics of the Roman Church, who gain, by confession, the great opportunities of human nature, have generally determined what is a crime to do, it is a crime to think.” 1750 “Language is the dress of thought.” “Curiosity is one of the permanent and certain characteristics of a vigorous mind.” 1751.

“Patriotism is the last refuge of a scoundrel.” 1775. “All theory is against freedom of the will. All experience for it.” “No member of a society has a right to teach any doctrine contrary to what the society holds to be true.” 1773

“This is one of the disadvantages of wine. It makes a man mistake words for thoughts.” 1778

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 (Many revolutionaries owned slaves) “I am willing to love all mankind, except an American.” 1778. (Said during the American Revolution) “The true measure of a man is how he treats someone who can do him absolutely no good.” “It is better to live rich than to die rich.”

1755

**An Act of God:** In Lisbon, on 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 in and around Lisbon. It was a huge emotional shock to Catholics across Europe. Catholic clerics said it was a “divine judgment.” [Blaming the victim is a common clerical technique, especially in Judaism. For believers, natural disasters are called “acts of God.”] But
“Divine judgment” was not credible in any case as Lisbon’s sinful red-light district, Alfama, was barely affected.

1755

Kant

**Philosophy:** Immanuel Kant (1724-1804), born poor, greatest German metaphysician & transcendental philosopher, professor of logic & metaphysics at U. of Koenigsberg & the founder of German idealism. Kant credited Hume for “awakening me from my dogmatic slumber (of orthodox rationalism).” He made Germany an intellectual power. Like all natural philosophers, he agreed with Plato’s “All propositions must have a reason.”

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-caused immaturity...Use one’s knowledge without the guidance of another.” “Have courage to use your own reason.” Extremely influential, Kant combined Leibniz’s rationalism 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 felt that morality required a belief in God, freedom and immortality, although these cannot be proved scientifically or metaphysically. He argued that the human mind is the origin of the world as we know it. His way of thinking set the tone for all 19th century philosophy.

**Cosmology:** In 1755, *Kant’s General Natural History & Theory of the Heavens* posited the *nebular hypothesis* of the origin of stars & planets (in 1734, Emanuel Swedenborg had suggested the same). (See Laplace’s 1799 nebular hypothesis.) Kant speculated that the group of stars that Earth was in might be a rotating body of a huge number of stars held together by gravity & 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 the core remained. Thus, the outer planets were older than those closer to the Sun. He speculated that the Earth was millions of years old.

Kant also said that nebulae, apparent cloudy bright spots in the heavens) were not stars in our group of stars but “island universes” far beyond the stars one could see clearly. This was confirmed by Hubble 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. “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 laws, while the moral law within was a product of human freedom. Kant sought a theory unifying the universe and the working of the mind. (More Kant 1781, 1785, 1788, and 1790)

**Political theory:** Edmund Burke (1729-1797), Irish Anglican, in *A Vindication of Natural Society*, “All governments must frequently infringe the rules of justice to support themselves, that truth must give way to dissimulation, honesty to convenience...The most obvious 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...In a state of nature, a man’s acquisitions depend on his labors. In an artificial society, it is an invariable law that those who labor must enjoy the fewest things, and those who labor not at all have the greatest number of enjoyments.

1756

**The poor are to serve the rich**

Medicine: James Lind, Scot, British Naval surgeon, recommended that sailors eat citrus to prevent scurvy, which killed more sailors than war did. The Navy studied it for 40 years, then gave its sailors citrus. Scurvy disappeared.

Claude A. Helvetius (1715-1771), French deist, vehemently anti-clerical, in his *De l’espirit*, believed the differences between individuals was due entirely to differences in education. He accepted Locke’s *tabula rasa*, Men are born ignorant, not stupid; education can make them stupid. Ethically a utilitarian; contra Rousseau, he valued knowledge.

Science vindicated: The comet Halley had predicted in 1705 (Astronomer Royal in 1721) appeared as he predicted, strengthened confidence in science and destroyed a vast body of religious beliefs that comets foretold events. Catholics were allowed to read *Copernicus’s* 1543 *Revolutions* (but not *Galileo’s* 1632 *Dialogue* until 1835).

Voltaire wrote *Candide* 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?” Candide cited the 1755 Lisbon earthquake that killed tens of thousands on a Catholic high holy day. Voltaire wrote *The Philosophy of History* in 1766 to ridicule the nonsensical beliefs of religions, from the Chaldeans to Jews to Christianity. It added up the number of Jews killed by other Jews or at God’s order in the *Old Testament* at over 239,000. It was as popular as Erasmus’s *Praise of Folly*. Voltaire, a deist, termed Jesus a “good fellow,” but not divine.

1757

**Scurvy**

**Voltaire quotes**

Nothing can be more contrary to religion and the clergy than reason and common sense. 1764.

It is better to risk sparing a guilty person than to condemn an innocent one. 1747 (Blackstone later copied this.)

Atheism is the vice of a few intelligent people. 1748 Christians have been the most intolerant of all men. 1764

Judge a man by his questions rather than by his answers. The best is the enemy of the good. 1764

The greatest of all sins is to be wanting in faith...to question its opinions,... and to disdain its holy things. 1764

Clever tyrants are never punished. For 1,700 years, the Christian sect has done nothing but harm. 1767

Prejudices are what fools use for reason. Liberty of thought is the life of the soul. To hold a pen is to be at war.

Superstition, born of paganism and adopted by Judaism, invested the Christian Church from earliest times.
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 did not excommunicate sorcerers as madmen who were mistaken, but as men who were really in communication with the Devil, 1764. It is hard to free fools from the chains they revere.

It is dangerous to be right in matters on which the established authorities are wrong. A witty saying proves nothing. Ever sensible man, every honorable man, must hold the Christian sect in horror. The poor man is never free. It is forbidden to kill, so all murderers are punished, unless they kill in large numbers and to the sound of trumpets. Christianity is the most ridiculous, the most absurd and bloody religion that has ever infected the world. Anyone who can make you believe absurdities can make you commit atrocities, 1767 (ref 9-11-2001)

In religion, [heresy] does not mean actions hurtful to society, but actions hurtful to the clergy.

He is a hard man who is only just, and a sad one who is only wise. Christians have never observed their religion. To succeed in the world, it is not enough to be stupid. You must also be well-mannered. Evil strifes the world if God did not exist, it would be necessary to invent him. 1770. (Bukhanin, “If God really existed, it would be necessary to abolish him.”) Common sense is not so common. Man is free at the moment he wishes to be. I have never made but one prayer to God, a short one. Make my enemies ridiculous. And he granted it. 1767. It is only charlatans who are certain. Doubt is not a pleasant mental state, but certainty is a ridiculous one. 1770

Fanaticism’s most detestable example is those bourgeois who on St Bartholomew’s night ran to assassination, butcher, and chop to pieces those of their fellow citizens who did not attend Mass, Smart tyrants retire rich. God in his goodness takes away reason from those he intends to save or render useful to the Church.

Voltaire’s letters all ended with Ecrasez l'infâme! / Crush the infamous thing (usually seen to mean superstition).

In his Philosophical Dictionary 1764 (publicly burned in Paris), Voltaire defined Atheist as the name given by theologians to whoever differs from them regarding the divinity. He defined Christianity, a religious system attributed to Jesus, but really invented by Plato, improved by Paul, and finally revised and corrected by the Church fathers, and Devil, the black sheep of the heavenly hosts...The love of God is frequently but the fear of the Devil.

Robert Ingersoll said, “Voltaire did more for human liberty than any other man who ever lived.”

Frederick the Great told Voltaire, “I learn more from your doubts than from Aristotle, Socrates, and Descartes.”

(In 1851, Louis Napoleon ordered all libraries in France to remove all books by Voltaire.)

1761

French Enlightenment: Paul-Henri Thiry, Baron d’Holbach (1723-guillotined 1789), German-French philosophe, contributed c400 mostly scientific articles to Diderot’s Encyclopedie. He published (anonymously) several atheistic attacks on Christianity as an impediment to the moral advancement of humanity, starting with Christianisme devoile / Christianity Unveiled, in 1761. He hosted a salon attended by philosophes, called a “synagogue of atheists.”

James Otis Jr., Boston lawyer, argued against the “writs of assistance” that allowed British troops to enter colonials’s houses at will. Later, arguing against the Stamp Act, he declared, “Taxation without representation is tyranny.” Also, “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

Physics: John Harrison, Brit, after 48 years a clockmaker, devised a marine chronometer, simply a very accurate watch for ships. It could determine longitude. Thusly, as the Earth revolves 360 degrees every 24 hours, it revolves 1 degree of longitude every 4 minutes. Greenwich / London is zero degrees longitude. Wherever one is in the world, at any latitude, when the Sun is at its highest point above him, it is noon to him. So a sailor with an accurate clock set to Greenwich time sees what time it is in Greenwich when the Sun is at its highest point above him, i.e., his noon. If his noon occurs at 12:04 GMT, he knows that he is 1 degree longitude west of Greenwich, & so on.

1762

Romanticism: Rousseau’s (1754) On The Social Contract glorified the common Man, the noble savage, identified a social contract between men and their government. No social right comes from nature. All social rights come from an agreement among peoples. The sovereign is limited to the making of general laws. It famously began with, “Man is born free, and everywhere he is in chains.” His hero greatly influenced education when he argued for a “natural education” for children. He felt that civilization was a decline from the state of nature. He advocated “feeling,” not reason. He wanted people (men 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. Determining the general will was difficult, and there was no protection for those who disagreed with the general will. The ideal government is a small elected group.

Rousseau’s novel, Julia, the century’s best seller, reflected the increased societal empathy for the rights & needs of common people, a sea change in Western culture’s attitudes. Born Catholic, he became a deist. Rousseau stressed a link between liberty and equality. “Liberty is obedience to the law which one has laid down for oneself.”

But, Rousseau considered women to be inferior to men. The whole education 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 sweet and pleasant; these are women’s duties.

“Laws are always useful to persons of property and hurtful to those who have none.” His conception of equality suggested that nations are founded on the dignity of the common people rather than on hierarchies, an unhistorical notion. His ideas paved the way for the romanticism which succeeded the Enlightenment in the early 19th century.

Bertrand Russell later said that after Hume destroyed empiricism, unreason, i.e., romanticism, grew; that
America

1762 **Religion:** Catholics in Toulouse tried, tortured, and killed a Protestant for converting Catholics to “heresy.”

1764 **Cesare Beccaria’s Crimes and Punishments:** Punishments ought to deter, not brutalize; ban the death penalty. All law and power must justify itself by showing that it secured the greatest happiness at the least cost to individual liberty. Other laws are unjust. No religious crimes, no victimless crimes, no penalties beyond the minimum needed to deter.

1765 **Physics:** James Watt improved Thomas Newcomen’s inefficient 1712 steam engine. Watt & ironmaster Matthew Boulton transformed Britain’s economic life with the improved steam engine, which made the Industrial Revolution possible. They laid the foundation of modern mechanical engineering. It made the modern factory system possible. The concept of mechanical power entered Man’s consciousness. Watt’s engine was still just 5% efficient. That is, the output of work was just 5% of the output of heat (coal was cheap). (See 1824 Sadi Carnot). He & Boulton had a monopoly of steam engine construction for 25 years. They became rich.

1777, then punishing them horribly. The Catholic Church commissioned a refutation of

1766 **Religion in America:** Most colonies were nominally Protestant, of different sects. Massachusetts. Puritans were heavily Old Testament, bigoted, killed witches and Quakers. (The Puritans’ criminal code was drawn explicitly from the Torah. Mencken, They “had a haunting fear that someone, somewhere, may be happy.” (Puritans hated bear baiting not because it was cruel to the bear, but because it gave pleasure to the spectators.)

Each colony supported its Protestant sect; and all but Pennsylvania, founded for Quakers, had laws against Quakers, which was founded c1647 by George Fox & which had no organized clergy. Pennsylvania became the most prosperous colony, with Philadelphia as the largest city in the colonies. Slaves were property. In Virginia, killing non-Christians was legal. Virginia regulated religions so that only Anglicism could qualify. Women had few rights, Blacks none.

Unrest in America: The colonies differed in religion, acceptance of slavery, economic systems, patterns of land ownership, but had in common the threat from the French, from Indians (whose lands they were taking), & mostly the oppressive trade restrictions of the British. Holland carried the most trade goods worldwide, but, all British colonies’ trade with other countries had to be bought or sold through British ports & British agents. British imperial supremacy was based on its sea power. Brits were quartering troops in houses. In New York, the Stamp Act Congress promulgated a Declaration of Rights, protesting the Tyrannical Acts of the British Parliament. Parliament & George 3 snubbed it.

1766 **Chemistry:** Henry Cavendish (1731-1810), Brit., isolated hydrogen, called it flammable air. In 1783, he saw that water was not an element when he exploded hydrogen and air with an electric spark which created water. He calculated the weight of Earth from its gravitational effects (off by only 1.3%). He anticipated the law of the conservation of energy. Static electricity: He discovered that the attraction or repulsion of 2 small electrically charged bodies varied directly as the product of their charges & inversely by the square of their separation, i.e., like gravity. Little was done regarding static electricity until Faraday prepared Cavendish’s papers for publication. See Timeline p 123, 1810-Faraday.

1766 **Biology:** Albrecht von Haller (1708-77) Swiss, showed that nerves controlled muscular movement, led to the brain.

1768 **Biology, Evolution:** Adam Ferguson, chair of natural philosophy, Edinburgh, wrote Essay on the History of Civil Society. Progress is not linear or inevitable; history proceeds in a mist. Modern society (specialization of labor) makes men weak and soft, lose their sense of honor and courage. He influenced Hegel and Johann von Herder, founder of modern “cultural nationalism.” The term “natural philosophy” referred generally to all branches of science. Specific branches, physics, biology, had their own names.

1768 **Political Theory:** Joseph B. Priestley (1733-1804), Arian / Unitarian minister, chemist. His Essay on the First Principles of Government used Hutcheson’s 1725 phrase “the greatest happiness for the greatest numbers” as the test for moral action. He tried to fuse Christianity with rationality. He joined the Royal Society in 1762. (More 1775)

1768-71 **Botany Astronomy, navigation:** Sir Joseph Banks sailed three years around the Pacific on Captain James Cook’s first circumnavigation & collected c30,000 plants, c1,400 not seen before, upping by 25% the number of known plants. Plant and fauna collecting became an international mania in the 18th century. As more & more species of animals were found, Christian theologians announced that Noah’s ark was really six times larger than previously claimed. The Royal Society paid Cook a bonus over his naval salary to chart the transit (planet passes between Sun & Earth) of Venus from Tahiti (letting astronomers fix the size of the solar system by parallax & Kepler’s 3rd law).

1770 **Atheism, Dogma vs. reason:** D’Holbach published his most famous, Le Systeme de la nature. It denied the existence of a deity. The universe was nothing but matter in motion bound by inexorable natural laws of cause & effect. “Ignorance of natural causes created the gods & priestly impostures made them terrible.” “All religious notions are uniformly founded on authority; all religions...forbid examination, & are not disposed that men should reason upon them.” It described God as laying snares for men, inviting them to sin, which [God] could prevent, & then punishing them horribly. The Catholic Church commissioned a refutation of d’Holbach’s book & threatened king Louis 15 with ending financial support unless he effectively suppressed circulation of the book.

In 1777, D’Holbach said that faith & reason contradict each other. Either faith is a chimera or reason is useless.
Weimar Classicism: Johann Gottfried von Herder (1744-1803) with Goethe & Johann Christof Friedrich von Schiller (1759-1805) sought to establish a new humanism by synthesizing Romantic, classical, & Enlightenment ideas. Herder argued that every folk / volk had its own particular identity that was expressed in its own language and culture. Human creativity, unpredictable and diverse, is as important as human rationality.

Captain Cook used a copy of a Harrison clock on his 2nd & 3rd circumnavigations. He accurately mapped much of the Pacific. Cook was the first to prevent scurvy in his crew (He fed them sauerkraut). The British Navy used citrus 26 years later. In 1773, after unnecessary bureaucratic delays & the king’s intervention for Harrison, then 80, Parliament partially paid him. Watchmakers were the ultimate craftsmen of the day. Latitude was still reckoned with an astrolabe.

Medical: John Hunter, Scot, turned surgery from a barber’s part-time job into a scientific discipline of anatomy & biology. He taught Edward Jenner, & Jenner other doctors experimented with cowpox inoculations to prevent smallpox

Astronomy: Charles Messier, French, found and listed over 100 cloudy blobs of light in the heavens, Messier objects.

To protest British taxes on tea, 150 Sons of Liberty dressed as Mohawk Indians and tossed three shiploads of tea into Boston harbor, the Tea Party. So, the Brits stupidly closed the harbor. So the First Colonial Congress issued a Declaration of Rights.1774. The colonies’ elites, Enlightenment men, knew their rights from Locke.

In April 1775, a British army unit marched from Boston to Lexington to arrest John Hancock and Sam Adams (a brewer and rebel) for treason. At Lexington, a ragtag militia fired on them, “the shot heard round the world.” Brits went to Concord and then retreated to Boston. The war was on. In May 1775, the Second Continental Congress in Philadelphia with delegates from the 13 colonies, to unite the colonies, named a Southerner, George Washington, a wealthy Virginia slave owner, commander. Pennsylvania militia privates petitioned to elect all their officers.

Political: Edmund Burke (ref.1756), Irish Anglican, in Parliament, advocated reconciliation with the colonies and critical of King George 3. Burke wrote, “It is not what a lawyer tells me I may do, but what humanity, reason and justice, tell me I ought to do. All government—indeed, every human benefit enjoyment, every virtue and every prudent act is founded on compromise and barter...a great empire and little minds go ill together.”

Chemistry: Priestley (ref 1768) isolated a gas from a brewery next to his house, saw how brightly it burned a candle; put a mouse in it; saw how well the mouse did. Breathed it himself. He also discovered that green plants breath out oxygen. He discovered a wide range of new gasses, including nitrous oxide, ammonia, nitrogen, carbon monoxide, sulphur dioxide, and oxygen. He believed that the chemistry of air was governed by the erroneous theory of phlogiston.

Land reform: Thomas Spence (1750-1814), Scot, “If we want to get rid of evils amongst men, we must destroy...the cause of them, private property in land...The land shall no longer be...the property of individuals, but of parishes.”

Thomas Paine. Common Sense

On June 12, Virginia adopted its Declaration of Rights, written principally by George Mason and inspired by Locke, “All men are by nature free and equal...governors are servants of the state.” John Adams, a Boston lawyer and revolutionary, favored independence but disliked Paine's "democratical ideas." Adams reluctantly called the era "The Age of Paine." The colonies routed their royal governors. Many colonists remained loyal to the king.

Independence: In July 1776, after a year at war, the Second Continental Congress adopted the Declaration of Independence, inspired by Holland’s 1581 Oath of Abjuration, by Mason’s just adopted Virginia Declaration of Rights, and by the writings of Paine and Locke. Thomas Jefferson (1743-1826), a wealthy Virginia slave owner, with John Adams & Franklin, wrote it, using the Enlightenment's Euclidian (self-evident) concepts of natural rights. Its style was that of a common law pleading.

1. “We hold these truths to be self-evident [could have said God GIVEN]. That all men are created equal; that they are endowed by their Creator with certain inalienable rights, life, liberty and the pursuit of happiness,” (a phrase once used by Locke as key to liberty although Locke was much better known for saying “life, liberty, & property”).
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
At the time, England’s Caribbean possessions, because of sugar, were far more important economically to England than the American colonies. America’s population, of about 2.8 million was almost half that of England. Mexico City was then larger than any American city, had a larger population than any European city except Paris or London.

Political Theory: Montesquieu and Sir William Blackstone, a learned jurist, saw the English “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 advocated a unicameral legislature in each colony and a national unicameral one. He also advocated for women’s rights and against slavery.

Society: England pre-1770 was a manufacturing country, but a cottage based manufacture. The most important technological invention of the 18th century was the factory, where Man worked with machines, powered by steam.

1776 Economics: Adam Smith (1723-1790), deist, Chair of moral philosophy at U of Glasgow, student of Hutcheson (1725), published An Inquiry into the Nature and Causes of the Wealth of Nations, which described how the division of labor (which had developed over the centuries) in a factory increased productivity drastically. Wealth started the science of economics. It said that capitalism creates a more rational and efficient economic system than one directed by the government. This was illustrated by Britain’s shortsighted attempt to control the trade of the American colonies, which he felt would cripple Britain’s business there (it did) and cause Britain to lose its colonies (it did).

When merchants meet, they conspire.

Smith said that government should be limited to national defense, police, providing a system of justice to protect individual rights, particularly property, and public works like roads. When the government does more than that, it causes unintended consequences, that do more harm than good. He also saw the downside to the specialization of labor, people tend to see the world only from the very narrow perspective of their job. Smith described Wealth as “a violent attack on the whole commercial system of Great Britian.”

For Smith, consumption was the sole purpose of production & the interest of the producer ought to be accommodated only to promote consumption. He said that capitalism generated a great inequality of wealth. Said, a “government [run by] merchants is, perhaps, the worst of all governments for any country whatsoever.” He described the “mean rapacity” of the rich and the hypocrisy of advocates of unregulated capitalism; 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.” and “Science is the great antidote to poison of ...superstition.”

1776 The rich love to parade their riches

“With [most] rich people, the chief enjoyment of riches consists in the parade of riches, which in their eyes 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 also said, “Science is the great antidote to the poison of...superstition” & that romantic love was ridiculous. Unregulated capitalism is called “laissez faire” economics. Smith knew its shortcomings, but never used the phrase.

Analogy

How we think: Josuha Reynolds, 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.

1776 Edward Gibbon (1737-1794), Brit., MP, important historian, published The Decline and Fall of the Roman Empire. It started secular history, “I have described the triumph of barbarism & religion.” Rome declined due the disease of Christianity. The Church’s insistence that only Christianity be practiced (unlike pagans) “appears to have infused a spirit of bitterness into a system of love & harmony.” Tertullian had exulted at the tortures in Hell of ancient rulers when God would end the world. Christianity was a fanatical cult who tortured far more than they had lost. Catholics had killed far more Protestants in a single province in one reign than all the martyrs killed by Romans in 300 years.

c1776 The Industrial Revolution, centered around Manchester, with the port Liverpool, coal, steam engines, canals, water mills, child labor, caused a big increase in knowledge, & like the American & French revolutions, was basically a social revolution. It established the middle class as the dominant class in politics & society. Liberalism & free enterprise ruled. The big increase in production from factories led to a large increase in transportation, especially railroad & steamships. Self-made practical men from the middle class managed the factories, built the machines, not aristocrats, as Oxford & Cambridge mainly taught the classics. England, with 2% of the world’s people, produced 20% of the world’s manufactured goods, shipped them worldwide (a nation of manufacturers & shopkeepers). This was the British Empire.

Society: In Europe, societies were becoming freer & more open. Around the Med, women remained chattel. In the more advanced Northern Europe, women had more rights. Salons, clubs (including the Freemasons), and coffeehouses (around 550 in London) were intellectual and social centers, all breaking up the ice of tradition and convention. Literacy expanded, mainly in cities. East of the Elbe authoritarian governments ruled farming peasants.

1776 The subjugation of women: 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 tyrants if they could.” (Ref. Dostoevsky’s The Gambler). But, neither the 1781 Articles of Confederation nor the 1789 Constitution nor the 1791 Bill of Rights “remembered the ladies.”

**Paine’s The American Crisis**

Paine: In December, Washington read Paine’s pamphlet, Crisis, to his men in Valley Forge. “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.”

In France sought and got French help, including troops under the 20 year old Marquis de Lafayette.

**Recall Cicero, Do what’s right: Joseph Knight,** a slave in Jamaica whose owner took him to Scotland, sued for his freedom. Lord Kames, speaking for the Court of Session freed him, stating, “We sit here to enforce right, not to enforce wrong.” Jamaican law, being here unjust, could not be supported in Scotland. The decision’s importance was that the judges decided the case based on principles of equity and justice, not established law. Washington, Jefferson, et al, were of course traitors to the then established government, England, but heroes / patriots to the cause of right & justice.

**Botany: Jan Ingenhousz,** Dutch, discovered that plants absorb oxygen at night and emit it in the daytime.

**Hume on the Design Argument:** In Dialogues Concerning Natural Religion, a classic text on theodicies, published posthumously in 1777, Hume answered the Teleological / Design Argument earlier advocated by Aquinas (1273) and by Leibniz (1710). Hume thought it nonsense to use human reason as a criterion for explaining the world. “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 are inconclusive and establish only that something, not necessarily God, may have been a first cause.

Hume advanced several independent arguments to refute the Design Argument. Specifically:

1. **False dilemma**

   Hume, The Design Argument posits a false dilemma / limited choice, i.e., “Was the world designed or did it happen by chance?” Limiting an answer to just two choices is a logical fallacy. [p. 190] 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 logically corollary of the law of identity. [A correct third unnamed alternative is scientific; did the Earth evolve? (Stuart Chase, “If you let an enemy select the terms of the argument, he has already won.” Johnny Carson, “You buy the premise; you buy the bit.”)]

2. **Analogies can mislead**

   Hume, The Design Argument is based on a misleading analogy: Analogies are trustworthy when the matters are similar. Because of our experience, we can recognize human designed objects, i.e., a watch, or comparing scattered rocks to a rock wall. But 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. [Recall Voltaire’s Candide, “If this the best of all possible worlds, what are the others like?”]

3. **Proves nothing**

   Hume, Even were the Design Argument completely accepted, it does not lead to any particular god. [Aton, Jesus, Allah, Zeus,] or even a competent or moral designer, only that something some time in the past 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. **Bad design means dumb designer**

   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 infant deity, who afterwards abandoned it, ashamed of his lame performance.” Specifically, “If the well functioning nature is evidence for intelligence, benevolence, & 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.” (Charles Darwin a century later also rejected the Design Argument for this reason.)

   Suffering, starvation, & privation afflicted billions. Do these evils show good design? This is the Underachiever Problem of the Design Argument. [Scientists note that the human body could be much better designed. Some examples, birds have better eyesight, the pelvis is too narrow for childbirth, arteries & the laryngeal nerve take unnecessary complicated paths.] (Aldous Huxley said, “Maybe this planet is another planet’s Hell.”)

5. **What purpose?**

   Hume, To see if the universe is actually well ordered, 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.

6. **What**

   Hume, If a well ordered world required a designer, then the designer’s mind, being well ordered, also required a...
7. Hume, **often** what appears to be purpose, where it looks like an object has a particular feature in order to secure some particular outcome, is better explained by a filtering process, that is, the object wouldn’t be around if it didn’t possess that feature, & the outcome is only interesting to us as a human projection of goals onto nature. **Hume** said humans are the result of trial & error. This mechanical explanation of teleology anticipated Natural Selection.

8. And, said **Hume** (and Kant), such reasoning is natural, but it is not scientific, as it generates no new predictions. It merely represents a primitive preference for explaining the unknown in terms of agency rather than in terms of natural law, which **Leibniz** did not show was insufficient. The **Design Argument** sees the world as a finished design. [A win-win situation for believers. A miracle, an event that violates the laws of nature by a deity, is proof of God (St. Paul re Jesus). But, the Design Argument says the regularity of the world is proof of God. (Aquinas and others)]

1779 **James Madison** (1751-1836), a wealthy Virginian slave owner, proposed to resolve the “property” or “pursuit-of-happiness” dichotomy by defining property as all that a man owns and values, i.e., his property, his opinions, religious beliefs, and his security. This concept is radically revolutionary, i.e., the U.S. government must respect the rights of property and the property in one’s rights. It is not possible to go beyond it.

1780 **Dogma vs. dogma**: The Assembly of the French Clergy (Catholic) condemned the partial tolerance granted to Protestants and petitioned **Louis 15** to give Protestants no further privileges.

1781 The colonists won with French help. The **Articles of Confederation** were adopted. Paris Peace Treaty signed in 1783.

**Critique of Pure Reason**: Kant, 1781 The two major scientific schools of the day were British empiricism (Locke, Berkeley, Hume) and Continental rationalism, both were anti-clerical. Kant (ref. 1755) wrote *Critique of Pure Reason* (a priori reason), his most important book and one of most influential books in the history of philosophy, to counter Hume’s assertion that we can’t really know if something is true solely by observation as causality can’t be proved in a reliable way. In short, the purely sensory base of knowledge is inadequate. This view led to skepticism. Kant said that Hume’s extreme skepticism and empiricism don’t explain how the achievements of mathematics were possible.

Kant argued that to establish the possibility of metaphysics as a science, it must be shown that synthetic a priori truths are possible. 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). He agreed with Locke that knowledge depends on experience, but that this did not necessarily mean that Man did not have certain features of mind that enable him to understand his experiences. The mind is not a tabula rasa because thinking depends on applying 12 certain fundamental abilities of the mind, like unity, substance, quantity, math truths, space, time, & causality which 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.

Thus, because of such inborn attributes in our mind, certain knowledge a priori, i.e., knowledge from such reason alone before experience, is possible. That is, by virtue of the forms and categories inherent in the mind, Man possesses the presuppositions for coherent and intelligible reasoning and experience. (Same, Branden 1964).

Knowledge consists in organizing chaotic perceptions that we experience into a ordered world. Human understanding relies on more than the senses as the mind interprets the world with its own a priori structures and categories of thought. All our knowledge falls within the bounds of possible experience.

**Reason vs. dogma**: Kant argued that Anselm’s Ontological Argument used two distinct realms of thought - that of pure reason, deduction, like mathematics, in which true premises insure true conclusions, and that of things, in which we reach conclusions based on experience. But Kant said that existence was not a predicate, i.e., premise 2 was false, “Existence is not perfection.” Postulating that things exist and thus they do is circular reasoning.

Kant: The Ontological Argument does not prove there is a God. It simply assumes there is a God. That is, “While we may conceive of God as having the property of, for example, being omnipotent, etc., existence is not a property of a thing at all. Thusly, suppose that one gives a complete description of an object, size, weight, chemical composition, etc. To then add that the object exists does not add anything to the object or the concept of the 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 2 gone, the Ontological Argument fails. Or, substitute Utopia “Utopia is the most perfect society conceivable. It is more perfect to exist than not exist. Thus
**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 cause God, in Cosmological Arguments like Aquinas’s five arguments, is simply the Ontological Argument repeated 5 times, which he’d shown false. Only observation and experience can determine that things exist. **Kant** said the Design Argument seems reasonable but God cannot be just a designer. To be theologically adequate, God must be all-everything, powerful, knowing, etc. which is a radical logical gap from being a mere designer.

Even so, **Kant** was a believer in a God. He argued that the existence of God can be deduced from the existence of good. Bertrand Russell (1912, 1922, 1927, 1929, 1950) later 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 one, a moral argument, and that quite convinced him.”

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**Land reform:** William Ogilvie, Brit. 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 first and third belong to the community, the second to the landowner, the value of whose land 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.

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**Reforming Judaism:** Moses Mendelssohn (1729-1786), Berliner, published Jerusalem, or On Religious Power and Judaism. It pointed out that the Hebrew Bible nowhere ordered belief, it only ordered actions, or non-actions, opening the way for Jews to be unbelievers or deists. It praised Socrates’s ability to say, “I do not know.” He advised following local customs. He also said, “**Kant** had so destroyed the last remaining proofs of God, that he was “the all destroyer.” In 1787, he said, “Science is organized knowledge. Wisdom is organized life.” “I had to set limits to knowledge in order to make place for faith.” “Everything in nature acts in conformity with law.”

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**Astronomy:** John Michell (1724-1793), English geologist, postulated the existence of a body so heavy that not even light could escape its gravitational pull, called it a dark star. In 1796, French mathematician / astronomer, Laplace (1799) described this idea in the first two editions of his book Exposition du Systeme du Monde. Later editions deleted it. The idea was not at first widely accepted, as the accepted view then was that light had no mass, and thus could not be influenced by gravity. **Newton** had said that gravity affects light. **Einstein** agreed. (1905)

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The Royal Society of Edinburgh was formally established, with a mandate broader than the Royal Society in London.

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**Modern chemistry:** Before 1783, despite Boyle (ref. 1663) and centuries of underground experiments in alchemy, chemistry was only a variety of isolated experiments without a general theory. In 1679, at age 26, **Antoine de Lavoisier** (1743-1794), French, was elected to the Academy of Sciences. Beginning in 1772, **Lavoisier** changed chemistry from qualitative to quantitative. He started with a plan, read all he could about earlier experiments and systematically experimented. In 1778 **Lavoisier** had said air is two different gasses. (It’s actually several.).

In 1783, he read a startling paper to the Academy, Reflections on Phlogiston which destroyed the then common belief that a substance existed called phlogiston that was important in combustion. In his lab, with Pierre Simon Laplace (see 1799), **Lavoisier** showed water was not an element but a combination of two gasses, oxygen and hydrogen & could be decomposed & recombined.

**Lavoisier** proved experimentally that rusted iron (iron plus oxygen, iron oxide) was heavier than its iron content. Combining any substance with oxygen is oxidation, a leaf burning, iron rusting, or paper turning yellow with age. As iron chemically combines with oxygen it picks up the weight of the oxygen and becomes iron oxide. Furthermore in a closed container of iron and air, the total weight of the rusted iron and the remaining air in the container remains the same. This is the Law of Conservation of Mass, one of the great discoveries of the 18th century. [later, due to **Einstein**] superceded by the law of Conservation of mass-energy, but still valid in a closed system.

Oxidation supplies heat for all living things in cells in organisms. His brilliant wife, Marie-Anne, multi-talented, learned English to translate for him, a good artist and skilful lab assistant, she illustrated his papers and wrote up his findings. **Lavoisier’s** significance rests not on any discovery, but on his systematic approach to chemistry.

Brothers Jacques and Joseph Montgolfier flew a hot air balloon (with a rooster, a duck, and a sheep) 6 miles over Paris. A few months later, Jacques Charles (1746-1823) and Nicholas Roberts flew a hydrogen filled balloon.

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**Ethics, Foundations of the Metaphysics of Morals:** Kant (ref. 1755, 1781). 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 as obedient to the moral law. Duty consists of observing his categorical imperative, “Act only according to that maxim whereby you can at the same time will that it should become a universal law.” There are similar versions.

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**Geo**
**Evolution of Earth.** He said that the Earth was far older than currently thought. He said clamshells were found on mountains as mountains were formed by the heat from a hot core of the Earth pushing land up. Mountains eroded, left sediments. Re the age of the Earth, said, “We find no vestige of a beginning, no prospect of an end.” He originated **uniformitarianism**, rocks, etc are modified over eons by natural processes. He began geology as a science.

**Astronomy:** William Herschel, (1738-1822) Hanoverian Brit, built a telescope 9 times more powerful than the Astronomer Royal’s, (He had discovered Uranus in 1781). He said that our solar system was part of a larger group of several million stars. He drew a diagram describing the system he saw [the Milky Way] in the shape a pancake. He noted 2,500 cloudy spots that he called spiral nebulae (clouds) and thought they were in the Milky Way. Until the 1920s, the Milky Way was considered the total universe.

Tunis, Tripoli, Morocco, & Algiers were capturing American ships in the Med and ransoming their crews. Tripoli’s ambassador, Abd al-Rahman, told Jefferson & Adams in London that the Koran authorized Barbary states to capture & enslave anyone from nations that didn’t acknowledge Islam’s religious authority, as such nations were sinners.

**Physics:** Jacques Charles (1746-1823). French, like Amontons c1702, had said that heat caused gasses to expand, but did not publish his data. Gay-Lussac in 1802 quantified the expansion.

Wolfgang Amadeus Mozart's (1756-1791) Don Giovanni/Don Juan was 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 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. At 25, Mozart had written 100s of works. He left his patron, the archbishop of Salzburg, and without a patron, died in poverty in ten years.

**America:** To establish a strong central government and ensure the protection of property, including the protection against Muslim pirates in the Med, the elites proposed a federal Constitution (but without protections of freedom of religion, speech, press, assembly, a speedy & public trial by jury, security of persons and their possessions against search & seizure, double jeopardy, the right against self-incrimination, prevention of cruel and unusual punishment or excessive fines). It had no national election, just an electoral college. Alexander Hamilton & James Madison emphasized protecting American trade from the Barbary pirates. The Constitution prohibited nobility, established a navy, did not outlaw slavery or give women, the property-less, or non-believers the vote. Slavery was justified as being in slaves’ best interests, arguing it was in a slave owner’s best interest to treat his slaves well, an odious argument. In the census, slaves were counted as 3/5 of a person. As slaves didn’t vote, white voters in slave holding states were over-represented. Slavery was legal in most of the 13 states in 1789 but outlawed at least in the North by 1804.

Hamilton had wanted a monarchy. Said, “Our real disease - which is democracy.. All communities divide themselves into the few & the many. The first are the rich wellborn, the other the mass of the people...The people are turbulent and changing, they seldom judge or determine right. Give therefore to the [rich] a distinct permanent share of the government. They will check the unsteadiness of the [people].” So, the Senate was created to check the masses.

**Kant’s 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 and in all situations), [a rewrite of the Golden Rule] namely “Act only according to that maxim whereby you can at the same time will that it should become universal law.” (Treat others like you would want everyone to act.) This was Kant’s central philosophical concept of his moral philosophy. This was his Argument from Morality for God. Arguments from Morality are a family of arguments based on the thesis that because moral norms exist, the most likely source of such norms is God.

Thus, laws should codify moral duty. In fact, only the most basic and general moral rules are universal; “Don’t kill innocents, don’t steal.” Such basic moral rules of conduct would arise in any culture, as they help that culture survive. Many moral rules are specific to one or a few cultures. Moral standards differ from culture to culture, and from age to age. (For example, few Christians today accept the Bible’s commands to kill unruly children, homosexuals, and adulterers, or to enslave or to treat women as property.)

**Kant,** Man’s “rational nature,” our ability to set ends - makes every human life of highest value, & provides the basis of all value in the world. Re the Problem of Evil, Kant said all theodices must fail. Evil is a personal challenge for every one to be overcome by faith. The Stanford Encyclopedia of Philosophy calls Kant the central figure of modern philosophy. Kant published the Conflict of the Faculties, which described contradictions between the Bible & reason.

**Problem of Evil**

Lavoisier published Elementary Treatise on Chemistry: defined a chemical as the last point an analysis can reach. He made the first good list of elements, 33 of them (some incorrect). Some, like gold and copper, were already known as they existed in their natural state. His most important contribution to science was discovering that combustion was simply combining with oxygen. This did in George Stahl’s phlogiston theory. It was translated into in English in 1790. He & 27 other officers of his company, Farmers-General, that collected taxes for the king were guillotined in 1794 during the French Revolution. Farmers General had a standing army of 20,000, who could enter & search homes.
1789 The Constitution was ratified by the states. Some had ratified it on condition that a bill of rights be adopted. Madison proposed a Bill of Rights, most of which became the first ten amendments to the Constitution, based on ideas of the Enlightenment and George Mason's Virginia Declaration of Rights. They were ratified in 1791. The First Amendment protected speech & the right to assemble and required the state to tolerate and stay out of religion. This provision was meant to reduce the influence of the various states' official religions, as 11 of the first 13 states had a religious test to hold public office, nine states financially supported official churches. Due to the influence of the Enlightenment elites, America was the first nation to explicitly exclude religion as one of its basic principles.

So, America began with no state religion, no nobility or king, unified by language, the war, & the Barbary pirates, but it continued the protect of property, white males, with legalized slavery and the subjugation of women and Indians. Women generally could not vote, inherit, sue, sit on juries, make a will, hold public office, keep her children in event of a divorce, keep her wages, or own property." Like Muslims, American men feared that women were their equal.

Deism

Most Americans in 1789 were, at least nominally, Protestant. Sam Adams and John Hancock belonged to different Protestant churches, but most of the major founding fathers of America were wealthy and learned men of the Enlightenment, thus anti-clerical, even if they were simply non-Christian deists (1624) or only nominally Christian.

Thomas Jefferson

Many top leaders of the revolution were deists. Jefferson said, “Millions of innocent men, women, and children, since the introduction of Christianity, have been, burned, tortured, fined, imprisoned, yet we have not advanced one inch toward uniformity [of religious opinion]. What has been the effect of coercion? To make one-half of the world fools and the other half hypocrites. In 1785 he wrote, “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.”

Jefferson compiled what is now called the Jefferson Bible by deleting all mentions of divine powers in the Bible, leaving just Jesus' ethical sayings. "It does me no harm for my neighbor to say there are 20 gods or no god."

Benjamin Franklin

Benjamin Franklin, "I have found Christian dogma unintelligible. Early in life, I absented myself from Christian assemblies." When on state business in Edinburgh, he stayed with Hume. He also encouraged Thomas Paine

Washington

George Washington used principally deist, not Biblical, references to God in his writings. He spoke of the "grand 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.” It was ratified unanimously in 1797 under deist President John Adams.

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.” Absolute power intoxicates those who have it. (ref. Acton 1887).

James Madison

James Madison, 1785: “During 15 centuries has the legal establishment of Christianity been on trial, what has been its fruits? More or less, in all places, pride & indolence in the clergy, ignorance & servility in the laity, in both superstition, bigotry, & persecution. Religious bondage shackles and debilitates the mind & unfit it for every noble enterprise.

Thomas Paine

Thomas Paine: All national institutions of churches, whether Jewish, Christian or Turkish, appear to me no other than human inventions, set up to terrify and enslave mankind, and monopolize power and profit.

Washington, Jefferson, Franklin, Adams, Justice Marshall, Andrew Jackson, all advocated exterminating Indians. Similarly, like men worldwide, Jefferson and Adams thought women were inferior.

1789 Political Theory: Jeremy Bentham (1748-1832), Brit, jurist, philosopher, wrote Introduction to the Principles of Morals and Legislation expounding his basic ethical doctrine, men are obligated to do that which will produce “the greatest happiness of the greatest number, the foundation of morals & good legislation.” This is utilitarianism. The “greatest good” concept was first mentioned in Hutcheson’s 1725 Inquiry Concerning Moral Good and Evil, then in Hume’s 1739 A Treatise of Human Nature and then in J.B. Priestley’s 1768 Essay on the First Principles of Government.

For Bentham, pain and pleasure were the only intrinsic values. “The moral rightness of an act is determined solely by its consequences.” Intentions are good or bad only insofar as they lead to pleasure or pain. But, sometimes it’s a tough choice. He accepted acute pain for a few if it assisted a greater good for the many (a tough choice). There are problems of course, i.e., determining what is “good” or knowing what will make the most people happy.

To Bentham, social problems could be solved scientifically. He asked, “How good is the law? How can it be improved? This theory led to proposals for reforming laws, improving schools, changing the prison system, etc.

French Revolution

Political Theory, the French Revolution, Maximillian Francois Marie Isidore de Robespierre: From 1650-1789, France had the concept that one person must rule. It was the wealthiest country, an absolute monarchy. The people were a motley horde. The justification of monarchy was based on the “Great Chain of Being” (Plato) i.e., from the lowest in society up through nobility, to king and God. However, some Frenchmen had read Locke, Bentham, Rousseau, and Jefferson & had seen the Americans kick out the British and prohibit nobility & a state religion.
A mob stormed the Bastille on July 14, 1789, freeing a handful of prisoners. Some revolutionaries were returned soldiers who under Lafayette had helped America gain its independence. Jacobins / Robespierre promulgated a “Declaration of Rights of Man”, whose preamble resembled the U.S. Declaration of Independence. His goals were Platonic, the peaceful enjoyment of liberty and equality, the reign of eternal justice, whose laws are engraved, not in stone, but in the hearts of all men.

Lafayette was one of the Declaration of Right’s authors (Jefferson was the U.S. Minister to France at the time and advised Lafayette), but it went much further than the American one. It abolished slavery & 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 lies essentially in 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 French Revolution was the turning point in European history, destroying the old order, immensely more important around the world in changing intellectual history than the American Revolution. Its motto, Liberte, Egalite, et Franterie. The American and French revolutions were the first to be expressed in secular, not religious, terms.

Rights of Man

1790 Political Theory: Burke wrote Reflections on the Revolution in France, the founding text of modern conservatism, which contained a paean to the fragrance & charisma of Marie Antoinette. Reflections argued against natural rights, said all rights come from the history of the society. He condemned the Enlightenment.

Edmund Burke quotes

“Government is a contrivance of human wisdom to provide for human wants... Men have a right that these wants should be provided for by this wisdom.”

“A perfect democracy is the most blameless thing in the world. As it is the most blameless, it is the most fearless.”

“All useful & legitimate innovations must result from the slow growth of the collective mind in accordance with tradition.

“Religion is the basis of civil society and the source of all good and all comfort.”

“Superstition is the religion of feeble minds.” “What is liberty without wisdom, without virtue?”

“The French are not fit for liberty, and must have a strong hand like that of their former masters to coerce them.”

Kant also said, “Reason utterly condemns war, which only an international government can prevent.”

Paine responded in The Rights of Man (1791), said that Burke “pities the plumage but forgets the dying bird.”

Burke is the authentic “Conservative.” His writings became the basic conservative critique of attempts to reform society based on abstract theories. Such classic conservatism is a philosophy of governing, be cautious, respect tradition. Burke agreed with the English Revolution of 1688 as it was a protection of the national traditions of Protestantism. The prevailing British system whose “traditions” Burke wanted to respect was the aristocratic caste system. He opposed poor people voting. Burke warned England not to imitate France, lest confiscation and plunder of property result and atheism replace religion. He termed the French revolution a threat to Europe and all mankind.

Paine’s The Age of Reason was a deist book. It posited philosophical arguments as a defense of God from those who traduced him in man-made screeds like the Bible. “The New Testament teaches us that the Almighty committed debauchery with a woman engaged to be married, & 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 & profit...Whenever we read the obscene stories, the voluptuous debaucheries, the cruel & 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. 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.”

Mary Wollstonecraft, (1759-1797) Brit, in Vindication of the Rights of Women, “The Enlightenment’s chauvinism is
hypocritical.” She wrote Burke, “I smother the contempt I feel rising for your rhetorical flourishes and infantile sensibilities.” She died giving birth at 38. After her, women’s suffrage was taken seriously.

**1793 Political Theory:** William Godwin (1756-1836), Brit., “Government can have no more than two legitimate purposes - the suppression of injustices against individuals in the community, & the common defense against external invasion.”

**1794 Biology:** Erasmus Darwin (1731-1802), grandfather of Charles Darwin, in *Zoonomia*, argued that all warm blooded animals came from one species & passed along to their offspring traits acquired during their lifetime (Lamarck 1809).

**1794 Eli Whitney** patented the cotton gin. It exploded the cotton industry, increased the need for slaves, cotton workers.

**Paleontology:** Baron Georges Cuvier, French, first paleontologist, saw animal fossils at deeper levels of extinct species; said in *Note on the Species of Living & Fossil Elephants*, that from time to time, global catastrophes wiped out groups of animals, contrary to the *Bible & Plato*, who said all things were carefully ordered & planned for all time.

**1795 Politics:** The French Revolution failed. Nobles throughout Europe resisted it. Napoleon Bonaparte, (ref. 1793) Corsican, commander of the French army, led a coup d’état in 1799, ruled as First Consul, then emperor in 1804, and thought himself the nation. He became a more absolute monarch than any others before. Napoleon disdained women. “Women are nothing but machines for producing children. Public education is not suitable for them; as they are never called upon to act in public. Marriage is all they look to.” The Code Napoleon, his proudest work, made women their husband’s property. He paraphrased Adam Smith, “England is a nation of shopkeepers.”

**1795 Paine’s Age of Reason, Part 2,** ridiculed absurdities in the Bible, became the most popular deist book ever written. It introduced deism to the masses, gave deism an aggressive, anti-Christian tone. For example, “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.

*The Age of Reason* made Paine a pariah to devout Christians everywhere. 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. Man cannot make [natural] principles; he can only discover them.”

**1795 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*, contradicted the current catastrophism (geologic formations were formed by sudden upheavals).

**1796 Zoology:** Georges Cuvier, French, first paleontologist, *Note on the Species of Living & Fossil Elephants*, saw dissimilar extinct animal fossils at deeper levels of rock than current species. Devout, he accepted catastrophism, tried to reconcile Hutton’s findings with the *Bible & Plato*, that said all things were carefully ordered & planned for all time.

**1795 Paine,** in *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.”

Albert Fichte (1762-1814) German, *Foundations of Natural Right*, self-consciousness was a social phenomenon. Other rational persons are necessary. He hated Jews. “Making free German citizens hurts Germany.”

**1796 Joseph, Compte de Maistre** (1753-1821), saw the Enlightenment as an age destructive of traditional values. Said monarchy was divinely sanctioned and the only stable form of government. The rationalists rejection of Christianity caused the disorder and bloodshed following the French Revolution. “To admire Voltaire means a corrupt heart.”

**1796 Medicine:** Edward Jenner injected pus from a cowpox sore into a boy. Six weeks later, he injected the boy with smallpox. The boy stayed healthy. So, a mild version of a moderately bad disease immunized against the severe disease. Inoculation against smallpox had been used in China and Turkey since at least the 1500s.

**1796 Math:** Carl Gauss (1777-1855), German, math genius. At 19, discovered a construction of the heptadecagon, was the first to prove the quadratic reciprocity law, which let mathematicians to determine the solvability of any quadratic equation in modular arithmetic, posited a prime number theorem, saw that every positive integer is representable as a sum of at most three triangular numbers 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.

In 1799, Gauss showed a new proof of the theorem 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 claimed to have discovered the possibility of non-Euclidean geometry, but didn’t publish it. This led to more research for non-Euclidean geometry. (see Lobachevsky 1826 and to Einstein’s theory of general relativity, which explained the universe in non-Euclidean terms.)

**1796 Cosmology:** Pierre-Simon, marquis de Laplace, (1749-1827), deist, French, eminent astronomer- mathematician, became an associate member of the *Academy of Sciences* at 24 & later dominated it. Published *Exposition du systeme du monde which* resurrected and developed Kant and Swedenborg’s idea that our solar system formed from the
condensation of a vast cloud of dust and gas and that certain such clouds were forming planetary systems.

1798 **Politics, Economics:** Thomas Malthus (1766-1834), Anglican priest, published, anonymously, *Essay On the Principle of Population.* "Population naturally increases more than farming yields do so there is a continuing struggle for food, so preventative checks on procreation are necessary." i.e., there will always be losers in the struggle for food. Said, "The histories of mankind that we possess are histories only of the higher classes." (Darwin read it in 1838.) Malthus answered the Problem of Evil by saying that evil exists to spur human creativity and production. [all evil?]

1799 The Rosetta Stone, with the same text carved in Egyptian Hieroglyphics, Egyptian Demotic, and classical Greek, was found by French troops. It was carved c198 BC. Scholars could then read numerous previously undeciphered texts.

1799 Astronomy: Laplace's (1796) book *Mecanique celeste / Mechanical Heavens*, 5 volumes from 1799 to 1825. Vol. 1 showed mathematically that the solar system was stable and did not need a god’s intervention to keep the planets in their orbits, as Newton had said. Napoleon asked Laplace why his explanation did not mention God. The most common account of this incident says that Laplace answered, "Je n'avais pas besoin de cette hypothèse-la. I had no need of that hypothesis." A friend of Napoleon, Joseph-Louis, Compte de Lagrange, present at the exchange, also a mathematician and astronomer, commented, "Ah, it is a fine hypothesis; it explains many things."

Laplace extended Newtonian mechanics beyond Newton's *Principia Mathematica* and applied a more modern calculus that he and others had developed. He came close to the concept of black holes independently of Michell (1783). He suggested there could be stars so big that their gravity could prevent their light from escaping.

In 1812, he published *Theorie analytique des probabilités* which unified all previous work on probability. Robert Fox said that the Age of Laplace saw the establishment of the discipline of mathematical physics with the techniques of mathematics being used to an unprecedented extent."

1800 Background: Before c1800, land was the source of most wealth. (There were very few bankers and merchants). Those who owned land were wealthy. Those who did not were poor. Over 90 percent of people were peasants / slaves / serfs / peasants / untouchables / natives / low caste, not in cities, almost all illiterate. Money was irrelevant to them. They worked from dawn til dusk, every day, from childhood until death, with lives as Hobbes said regarding life in the state of nature, "solitary, poor, nasty, brutish, and short." Children were abandoned, placed in poorhouses.

In England, one needed the permission of the local Justice of the Peace, normally the squire, to move from one's town. Peasants couldn’t own guns. JPs often sent persons to a penal colony for trivial offenses. The deer parks were closed to peasants. The rise of factories in cities with child labor dehumanized workers. The average life span in Europe was c37. This was Leibniz's "best of all possible worlds." England sent an estimated 300,000 persons (roughly 4% of its population) to penal colonies in America (c40,000), and after 1777, to Australia and other colonies.

Science: In broad terms, in the 17th century, science was rational, deducing events. In the 18th, it was empirical, devising experiments. In the 19th, it became experimental, manipulating biological events.

1800 By 1800, the world was connected. The century of colonialism was dedicated to science, and economic facts. New technologies, especially electricity, did for experience what printing had done for knowledge. Railroads transformed economies and created untold wealth for their owners and owners of nearby land. Before railroads, land travel was at walking speed. George Washington could travel no faster than Aristotle.

Power / energy was a new idea in science. Steam powered ships burning coal increased sea trade. The merchant class (bourgeoisie) expanded, Steam power (500 Watt steam engines were operating), employment for millions, manufacturing, mass produced furniture, cheap cast iron stoves, telegraph, oil, electricity, popular literature, missionaries, money, the science of economics, the settlements east into Siberia and west to California. Of these phenomena, the most important was money. Science became a major force fueling technological and social change.

Romanticism succeeded the Enlightenment. The Enlightenment gave Man values, rational thinking, demands to end religious persecution, and criteria which are still being actualized. The ideas that Man has inalienable rights, that government is the servant of the people, that religion is private and voluntary, that science is free, has inspired all movements for human legal equality since. The century ended with defiance of religion’s support of political injustice.

1800 Reaction to the French Revolution Politically, the first half of the 19th century in the West was a reaction to the French Revolution. Christianity came back into fashion. Conservatives said that the Revolution was destroying the grandeur of Europe, said violence was intrinsic to revolutions. In the 19th century, Europe’s population more than doubled, going from 20% of the world’s population to 25%, even while millions more Europeans emigrated to the Americas, principally to the U.S. The early 19th century was a period in which modern historical consciousness became a central component of intellectual life.

Utopian: Robert Owen (1771-1858), Brit., sought to alleviate the misery of the average factory worker with humane working conditions, built cooperatives that sold goods cheaply. 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. He was a lone voice. The gulf between the rich and poor grew. Hungry men rioted for food often between 1810 and 1850.
Religion: During the 19th century, believers argued that magic, witchcraft, i.e., obvious religious frauds, preceded monotheism, but modern religion (i.e., without witchcraft) manifested itself only in the higher stages of human mental development. A vain view, any belief in the supernatural is as true/false as any other.

1800s Various countries began to ban slavery: Prussia abolished serfdom in 1807. England banned the slave trade in 1808, India (under the Brits) in 1843, French colonies in 1838, the U.S. in 1867. Inequality of wealth & power continued.

Colonialism: The major European powers colonized the world to establish and control world markets. By 1850, the factories of the industrial revolution needed markets for their manufactured goods. England and France took most of Africa; England took the Mid-East and India. Spain and Portugal had South & Central America. Bishop Desmond Tutu later said, "When the missionaries came to Africa, they had the bibles and we had the land. They said, Let us pray. We did and when we opened our eyes, we had the bibles and they had the land." (from a Bantu saying) But advances in science and technology and the use of energy were far more transforming to society than political events.

England exported people, manufactured goods, capital, imported raw materials. The overall costs of Britain’s empire (colonial bureaucracy, Army, Navy, infrastructure, etc.) exceeded its benefits to the nation, but the class that ran the government, the mercantile class, prospered greatly. As Adam Smith put it, "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.” Most British scientists, inventors did not come from Oxford or Cambridge that taught mainly classics.

1800 Jefferson Philosophy: Jefferson: “I have sworn upon the altar of God, eternal hostility against every form of tyranny over the mind of Man.” This is in the Jefferson Memorial in Washington DC, and is considered a repudiation of organized religions. The 1905 book, Six Historic Americans quotes 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.”

Government reaches actions, not opinions Jefferson quotes In 1802, Jefferson wrote the Danbury Connecticut Baptists who feared persecution from the more numerous Congregationalists, that “the legitimate powers of government reach actions only, not opinions...and that the First Amendment established a “wall of separation” between Church and State.”

Similarly, John Locke’s 1689 Letter Concerning Toleration, "Officials should concern themselves only with civil interests...But as to inward things-our beliefs, our views, [how] we worship...officialdom has no business.”

Jefferson, “The Christian God is a being of terrific character - cruel, vindictive, capricious and unjust.” In Jefferson’s first inaugural, he stated, “Error of opinion may be tolerated where reason is free to combat it.”

Re corporations, Jefferson wrote, “I hope we shall crush in its birth the aristocracy of our moneyed corporations which dare already to challenge our government.”... “The government is the strongest of which every man feels himself a part...A little rebellion, now and then is a good thing.”...“In every country and in every age the priest has been hostile to liberty; he is always in allegiance with the despot, abetting his abuses in return for protection of his own.” A strong strain of liberal Christian thinking, like Methodism, even in Catholicism, did develop and harsh Puritanism faded.

1785-1840 Electromagnetism Timeline for 1785-1840: See p.135 for the next Electromagnetism Timeline, for 1860-1897.

1785. Charles Coulomb French, Coulomb’s Law, The force of attraction or repulsion exerted on one charged body by another varies by the product of their charges & inversely by the square of their separation. (like gravity)

1791 Luigi Galvani, Italian, showed electricity transmitted signals to muscles. He invented the voltaic cell,

1791 Charles Coulomb showed that an electrical charge is on the surface of a conductor

1800 William Nicholson, Brit., and Johann Ritter, German physicist, discovered electrolysis by passing a voltaic through water, decomposing water into its component elements, hydrogen and oxygen.

Volta 1800 Alessandro Volta Italian, made a battery, a stack of silver and zinc discs, separated by brine soaked cardboard.

Unlike static electricity, a battery was a steady source of current. Voltage is analogous to fluid pressure in a pipe. 1802 Gian Romagnosi saw a voltaic pile move a magnetic needle. So saw electricity and magnetism were related.

1805 Luigi Brugnatelli, Italian chemist, discovered electroplating.

Volta 1806 Volta used a voltaic pile to decompose potash and soda, showed that they are oxides of previously unknown metals, potassium and sodium. This began the scientific field of electrochemistry.

Davy 1808 Humphry Davy, Brit., saw an electric current applied to chemicals could produce new chemicals. He isolated potassium, sodium, magnesium, calcium, strontium, aluminum, and 6 more elements & invented an electric arc light.

Faraday 1810 Michael Faraday (1791-1867) Brit., a distinguished chemist, published Cavendish’s (ref 1766) conclusion that the attraction or repulsion of 2 small electrically charged bodies varied directly as the product of their charges & inversely by the square of their separation, i.e., the law of electrical action was the same as gravity, except that the stress between two similarly charged bodies was repulsion and between dissimilarly charged bodies was attraction.

Faraday thought there must be some connection between the bodies & posited his lines of force through a medium.

Oersted 1820 Hans Christian Oersted, Dane, saw an electric current in a wire made a magnetic field around the wire, thus discovered electromagnetism. The discovery of a connection between magnetism & electricity was one of the most important discoveries of the 19th century. Electricity can create magnetism & vice versa. They are simply aspects of one fundamental force, the electromagnetic force. An electric motor magnetically pulls magnets around an axle.
Arago 1821 Francois Arago, French, discovered that an iron bar was magnetized when put inside a coil of a current carrying coil, but he did not realize the significance of the increased strength of the resulting field. He showed Oersted's electricity-magnetism connection to the French Academy of Sciences. He also developed the principle of magnetism by rotation. (As minister of war and marine, he abolished slavery in French colonies in 1838)

Faraday 1821 Faraday showed that electrical forces could produce motion by passing a current through wires which pulled magnets attached to an axle that then rotated. He built two devices that produced "electromagnetic rotation" [i.e., an electric motor]. His key breakthrough was the concept of the field around the electric current that pulled the magnets on the axle of the device. He saw that magnetism decreased with distance. He drew imaginary lines through the magnetic field connecting points of equal intensity, called these lines of force. 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.

1823 William Sturgeon, Brit., saw that leaving iron inside a helical coil of wire connected to a battery greatly increased the magnetic field, thus made the first electromagnet. He bent the iron core into a U bringing the poles closer, concentrating the magnetic field lines. He also made the first practical English electric motor.

Amper 1825 Andre Ampere, French, discovered the mutual influence of electric currents. He saw that 2 parallel electric wires attract or repel each other depending on which way their electric currents are flowing. The magnetic field in the space around an electric 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. This is Ampere's Law, the basis of study of the relationship between magnetic, electrical, and mechanical phenomena, electrodynamics. Magnetic phenomena are caused by charged molecular current. The amount of electric current is now measured in amperes, amps.

Ohm 1827 Georg Ohm, Electric current = voltage divided by resistance. Resistance of an element is now tallied in ohms.

1829 Francesco Zantedeschi, Italian: A magnet nearing or leaving a closed circuit causes a current.

Faraday 1831 Faraday (ref. 1810, 1821) 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 had the insight that electrical and magnetic actions are not transmitted instantaneously. He also discovered electrolysis (Nicholson 1800); established that magnetism could affect light & 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, etc, but the total amount of energy remains the same. This became known as the Law of the Conservation of Energy.

1832 Baron Pavel Schilling made the first electromagnetic telegraph, using a binary system of signal transmission.

1832 Hippolyte Pixii, French, made the first practical electric generator, developed alternating current, died at 27.

1833 Heinrich Lenz (1804-1865), German, Lenz's law. An induced current in a closed conducting loop will appear in the direction that it opposes the charge that produced it. The law is a common way of seeing how electromagnetic currents obey Newton's 3rd law (for any action, there's an equal and opposite reaction.).

1835 Joseph Henry (1787-1878), American physicist, devised a way an electric current could turn a wheel. So invented 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, named the first secretary & director of the Smithsonian Institution.

1837 William Cooke and Charles Wheatstone, Brits, patented and demonstrated a telegraph.

1838. Faraday (ref. 1810, 1821, 1831) discovered cathode rays using Volta's battery.

1839 Rudolph Kohlrausch German, said an electrolyte has a specific constant amount of electrical resistance.

1839. Alexandre Becquerel saw the photoelectric effect with an electrode in a conductive solution exposed to light

1840 James Joule (1818-89 Brit., “The amount of heat produced in a circuit is proportional to the time duration times resistance & the square of the current passing through it.” A quantity of heat can be equated to a certain amount of mechanical work. This new mechanical equivalence of heat was the start of the study of thermodynamics (1843).

1801 How we think: Johann Friedrich von Schiller (1772), "Against stupidity the very gods themselves contend in vain"


1801 Alexander von Humboldt (1769-1859) Prussian, greatest geographer/naturalist/explorer of the 19th century, brother of Wilhelm von Humboldt (see 1810), explored the Orinoco, found unknown tribes, saw the natural canal to the Amazon, found numerous new plants, designed the first isothermic map, saw the source of quinine, the bark of the cinchona tree, deduced the continental effect of weather, i.e., as oceans are heat sinks, places farthest from oceans have more severe winter & summer temperatures, & over 21 years, wrote a huge encyclopedia of his discoveries.

1802 Francois Rene’s The Genius of Christianity, popular defense of Christianity; its faults due to heretics, sophists, cynics.

1802 Physics: Joseph Louis Gay-Lussac (1778-1850), French, quantified Amontons’s 1702 and Jacques Charles’s 1787
insight that heat causes gasses to expand. He credited Charles's unpublished work. As Amontons's work came first, the law quantifying gas's expansion due to heat is now properly called the Amontons-Gay-Lussac Law. (see 1808).

It added temperature to Boyle's 1662 law of gasses (PV=k, a constant) and said that at fixed volume the pressure of a specific mass of gas is directly proportional to its temperature from absolute zero. (Or at fixed pressure the volume increases proportionately).

The concept of an absolute zero as the lowest theoretical temperature where all molecular activity ceases was known, and where a gas shrinks to its smallest possible volume where it liquefies & can shrink no more. William Thomson (1846) in 1848 quantified absolute zero at minus 273.16 Celsius. (See 1848).

1802

**Paley**  
**Design Argument:** Archdeacon William Paley (1743-1805) said if one finds a watch on a beach, one sees it obviously was designed by somebody, so, as the world works so well, it must have a divine designer. This argument for design incorrectly assumes that what is true of inanimate man-made objects is true for living organisms, which evolve naturally.

1802

**Biology, evolution:** Gottfried Treviranus, German biologist, said simple forms of life had gradually developed into more complex forms; living creatures can be modified by external influences; that species develop into other species.

1802

**Geology:** After Hutton died, John Playfair, a friend & mathematician, published an easier-to-read version of his book.

1803

**Optics:** Thomas Young, Brit, discovered interference of light, thus provided the first convincing proof of Huygens's 1690 Wave Theory of light. He was also the first to measure & describe astigmatism, & to explain that color sensation is due to structures in the retina corresponding to red, green, & violet. He also helped translate the Rosetta Stone.

1802

**Physics:** Benjamin Thompson (1753-1814), American, later became German Count von Rumford, elucidated the principles of convection of fluids & the circulation of ocean currents, the main agent of heat transfer on Earth.

1805

Sir Walter Scott (1751-1832), "Breathes there a man, with soul so dead, who never to himself hath said, this is my own, my native land." He invented the modern historical novel in 1815 with Waverley, 'Tis Fifty Years Since, then Guy Mannering, Old Mortality, Rob Roy, Ivanhoe, & Red Gauntlet. All based on the idea of cultural conflict.

1805

**Dalton, Atomism**  
**Physics, Atomic Theory:** John Dalton (1766-1844), Brit., said that all matter is composed of tiny particles he called atoms (ref. Leucippus and Democritus), which could neither be divided or destroyed. He said that all atoms of any one element are identical and differ from other elements' atoms in size and weight. The idea of atoms was not new but Dalton studied their size and how they combined into different substances. This is the basis of chemistry.

He showed that Atomic Theory could explain the law of definite proportions (i.e., chemical compounds always contain exactly the same proportion of elements by mass.). The concept of atoms is extremely important but was not fully accepted for about a century. Dalton's 1808 book, New System of Chemical Philosophy established modern atomic theory. All evidence of atoms was / is indirect and inferred.

1807

**Geological Society of London** founded.

1808

**Physics:** Gay-Lussac (ref.1802) is now best known for his 1808 Law of combining gasses, i.e., the ratio of the volume of gasses consumed or produced in a chemical reaction is equal to the ratio of simple whole numbers (coefficients in the balanced equation). Thus, carbon monoxide CO combines with oxygen O in a 2:1 ratio by volume. $2CO + O = 2CO_2$

1808

**Philosophy:** 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. Goethe was a humanist and irreverent. The legend of Faust (making a pact with the Devil) is as old as the legend of Don Juan. (Marlowe in 1592 wrote of it.)

Goethe wrote it over 20 years, completing the first part in 1808 and the second in 1832, a few months before his death. For 2,000 years, Christians had believed that true freedom came from God. It hadn't worked, why not deal with the Devil? Faust, seeking knowledge, power, pleasure, and wealth, made his pact with the Devil. Part One deals with the destruction of the Medieval world and its replacement by modern society, i.e., Faust falls in love with Gretchen and takes her out of a Medieval town but abandons her. The story demands we recognize a new world is being born. He studied Spinoza's pantheism and Leibniz's panpsychism.

1809

**Biology:** Jean-Baptiste Pierre de Lamarck (1744-1829), French, like Erasmus Darwin, an early proponent of evolution. In Philosophie Zoologique 1809, he correctly said that organs develop through use & wither through disuse. But wrongly said parents pass along traits acquired during their lifetime, like, giraffes have long necks as they stretch them to get higher leaves. Wrong, as genes one passes on are set at conception. De Vries's 1900 discovery that...
cellular mutations caused changes in organisms showed Lamarck wrong.] He also wrongly said that each species had an inescapable drive toward perfection of its species. He did improve Linnaeus’s system of classifying animals.

1810 Wilhelm von Humboldt reformed the Prussian education system. Free universities, textual criticism of the Bible.

1811 Poet Shelley was kicked out of Oxford for his atheism. In 1816, he lost custody of his children for the same reason.

1812 Physics, chemistry: Laplace (ref. 1799) said, “We may regard the present state of the universe as the effect of the past and the cause of its future. An intellect which at a certain moment would know all forces that set nature in motion and all positions of all items of which nature is composed. If this intellect were also vast enough to submit these data to analysis, it would embrace in a single formula the movements of the greatest 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.” This concept is called Laplace’s Demon. It is determinism.

(Buckminster Fuller in 1960 proposed a physical economic-trade model of the world to predict world trade.)

1814 Laplace proposed a mathematical system of Induction based on probabilities, which now would be called Bayesian.

1815 Geology: Tambora, E. of Java, erupted, biggest modern eruption, 150X as powerful as Hiroshima, ejected 160 cubic kilometers of ash, blocked sunlight. 1816 had no summer. Failed crops caused the worst famine of the 19th century.

1815 Napoleon After several successful military campaigns against Austria, Prussia, and other states, Napoleon was defeated, exiled to Elba (in the Med near Italy). He escaped, returned to France, raised an army, but was defeated by Wellington at Waterloo in 1815 (his 100 days) and exiled to St. Helena (remote S. Atlantic), where he lost the will to live and died in 1821 at age 52. Napoleon there said, “Muhammadanism is less ridiculous than Christianity.”

Metternich With Napoleon defeated, Austrian Count von Metternich, at the Council of Vienna, with England, Russia, Prussia and his Austria, recreated the old political order in Europe. It lasted until 1914. In France, the anti-religious fervor of the revolution was followed by a wave of religious conservatism. In Italy, religious freedom was not won until 1945.

1817 Economics: David Ricardo (1772-1823), Brit., banker, On the Principles of Political Economy and Taxation, “The natural price of labor is that price necessary to enable the laborers to just subsist and perpetuate their race, without increase or diminution....There is no way of keeping profits up, but by keeping wages down...If workers were paid more than a subsistence 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.” Malthus’s iron law of population and Ricardo’s “iron law of wages” justified not giving workers higher wages. (Henry Ford (a vicious Anti-Semitic) refuted this “law” in 1914 when he paid his workers $5 per day, double the going rate. All prospered.)

1819 Every substance requires a different specific amount of heat to raise its temperature. Pierre-Louis Dulong and Alexis-Therese Petit, French, showed that the specific heat of an element was inversely proportional to its atomic weight. The higher the weight, the less heat needed. Specific heat is easy to deduce, thus is used to determine atomic weight.

1819 Philosophy: Arthur Schopenhauer (1788-1860) German, pessimist. In The World as Will and Idea, “Only through history does a nation become completely conscious of itself...The greatest intellectual capabilities are only found in connection with a vehement and passionate will...The majority of men...are not capable of thinking, but only of believing, and...are not accessible to reason, but only to authority...Man is the only animal which causes pain to others without any further purpose than just to cause it...Nationalism: 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.” “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.” Schopenhauer called Anselm’s Ontological Argument “a charming joke.”

On philosophy, Schopenhauer said, “The deeply stirred mind of the real philosopher, whose whole concern is to look for the key to our existence, as mysterious as it is precarious, is regarded by [professors] as something mythological, if indeed the man so affected does not even appear to them to be obsessed by a monomania, should he ever be met with among them. For that a man could really be in dead earnest about philosophy does not as a rule occur to anyone, least of all to a lecturer thereon...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.”

Said, “Man is never happy, but spends his whole life in striving after something which he thinks will make him so.”
Law of Thought

1851. He argued that Man is both a knower and a willer. As knowers, Man has a view from without (the cognitive view) and as a free-willing being, Man has a view from within (the conative view). He first advanced a fourth law of thought: (Aristotle, 1. Everything that exists, is. 2. Nothing can be and not be at the same time. 3. Everything either is or is not.) Schopenhauer added 4. Of every thing that is, it can be found out why it is.

1820s

Capitalism, child labor: The English Factories Act of 1819 banned children under 9 from working in factories. Children 9-16 couldn’t work over 12 hours per day. American colonists as early as the 1600s imported children to work at no wages, just room & food. Samuel Slater, “Founder of the American Industrial Revolution” used children 7-12 in his textile mills. Massachusetts then ruled children under 10 couldn’t work in textile mills; Pennsylvania said under 12. Connecticut ruled children under 14 couldn’t work over 12 hours per day. In response to these and similar practices, various groups began to question the fairness of capitalism in favor of state ownership, socialism, often utopian in concept. Social reform ideas grew. In the U.S., persons without property could vote, due to the Jacksonian Revolution of the 1820-1830s. No laws “protected” Black children.

Simon Bolivar

Simon Bolivar (1783-1830) liberator of S. America, abolished inquisitions, became an atheist, excommunicated. In all South & Cent. American wars for independence from Spain, the Catholic Church & its Inquisition sided with Spain. The Inquisition formally ended in 1834, but an auto-da-fe (public roasting of Jews/ heretics) occurred in Mexico in 1850.

Philosophy:

Georg Wilhelm Hegel (1770-1831) German philosopher, influenced by Kant, gave German idealism a comprehensive system of thought. “Everything that exists is rational.” He introduced the idea of history as the unfolding self-realization of the world-spirit. He 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 & thought fit together rationally in an encompassing dialectic that is constantly evolving toward supreme self-consciousness, or Absolute Spirit.

Thesis, antithesis, synthesis. Repeat

Hegel wanted to see in concrete reality the working of some idea or Universal Mind. Thesis begets an antithesis which conflict is resolved by a synthesis, that becomes a new thesis and so on. The Absolute Spirit is behind all developments in the world. Then we’ll know all and see God. Philosophy is that which grasps its own era in thought.

Soon, most philosophers embraced, theoretically, the idea of change, accepted strife as essential to progress, saw things as parts of a whole, & themselves as characters in the unfolding of history. “What experience & history teach us is this - that people and governments never learned anything from history, or acted on principles deduced from it.” A philosophy of the absolute, it was the leading system of metaphysics during the second quarter of the 19th century.

He 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 and Eve 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.

c1820

Kinetic Energy: was more accurately calculated to be “half of mass times velocity squared.” (ref. 1735 Energy)

1820s

Judaism: Many Jews and rabbis began to ignore some traditional rules. Abraham Geiger, a reform rabbi, studied the Torah in secular terms, & said that its varied themes & authors & contradictions could not bind men in the modern age.

Catholic Anti-Semitism: Pope Leo 12 / Annibale Francesco del’la Genga required all residents of Rome to listen to cathexism, forbade Jews from owning property, and revived Medieval laws requiring Jews to wear distinctive dress.

Heat: Nicholas Leonard Sadi Carnot (1796-1832) French, worked out a preliminary science of heat, thermodynamics / the movement of heat. Heat is the internal energy of a body, the agitation of molecules. Specific heat is the heat capacity of a body, such as water. Heat flows only from a hotter body to a cooler body until they reach thermal equilibrium. Carnot measured that in converting energy from one form to another some energy is lost. This lost energy is called entropy, now the 2nd Law of thermodynamics (see 1848). Carnot showed that only a certain fraction of heat energy could be converted to work, even under the best conditions. The maximum efficiency of a steam engine depends solely on the difference between the hottest steam and the coolest water. He died at 36 of cholera.

Math: Nikolai Lobachevsky (1792-1856) Russian mathematician, developed a non-Euclidian geometry, a fundamental discovery that Einstein used 80 years later in his theory of Relativity. (See 1905, 1915)

Robert Brown

Physics, Brownian Motion: Robert Brown (1773-1858), Scot, a well regarded botanist, noticed that tiny grains of pollen suspended in water continued to move no matter how long the water stood. (The motion of tiny particles in water had been noted by Lucretius in 60 BC.) This became known as Brownian motion. In 1831, he saw the control point of a cell, called it the nucleus, and identified that structure as being the common element of all plant cells - a find as important as the later discovery of the atomic nucleus. Nuclei were soon discovered in animal cells.

About 50 elements were known.

1826

Political Theory: Benjamin Disraeli (1804-1881), Earl of Beaconsfield, later Prime Minister (1868-70,74-80), “All power is a trust ...We are accountable for its exercise... From the people, & for the people, all springs, & all must exist.” In 1845, “Property has its duties as well as its rights.” Until 1826, England had only 2 universities, Oxford & Cambridge.
Mormonism: Joseph Smith (1805-1844), after being convicted for fraud in New York for claiming to be able to locate treasure using peep stones, said that a prophet named Mormon wrote a book on gold plates, which he gave to his son Moroni, an angel, who then gave the plates & two magic stones to translate the plates to Smith. From behind a curtain, Smith, who could read but not write, dictated the Book of Mormon reputedly from the plates. An imposing figure, he allowed no one to see the plates. He claimed that his religion was returning to the original teachings of Jesus. Four of Smith's 35 or so wives were 14-16, some others already married. Mormons believe that God appeared to Smith.

Biology: Frederick Woehler (1800-1882), German, accidentally synthesized urea, an organic substance, from inorganic materials, proving that an organic substance (plants and animals) did not need a "vital force" to be formed. Also, he was one of first to isolate aluminum and beryllium. Organic chemistry is essentially the chemistry of carbon.

Fearing a revolt in Ireland, Parliament repealed some repressive laws against Catholics there, but raised the value of property one must own to vote (reducing Catholic voters), & kept Catholics' obligation to tithe to the Anglican Church.

Joseph Smith published the Book of Mormon. Most phrases in it were simply copied from the Bible. The phrase "and it came to pass" appears over 2,000 times. Smith said that virtually all Christian doctrine developed after Jesus was false. Some unbelievable passages, Jews are wicked (like Matt. 3:7). A Jewish lost tribe came to America around 600 BC & became American Indians...God is married to his goddess wife... Homosexuality is evil...God sent fiery flying serpents to bite people... God will force people to eat their own flesh... God was once a man on another planet... God gave Indians dark skin because they turned away from God...God killed Alma's enemies, as Alma asked him to, Alma 33:10. God curses one who marries an Indian. There is no salvation outside Mormonism. Jesus is the Son of God & the Father. Many passages describe Indians as filthy & loathsome. (Re Indians, all European-Americans, not just Mormons, cheated, robbed, slaughtered, & denied basic rights to Native Americans throughout American history.) Mormons believe God resides on or near a planet or star named Kolob, that Mormon men have a chance to become a god someday; that people begin as spirit children of God & his wife, a process that simply gave a spiritual form to an eternal intelligence that persons once were, which spirit children then become babies the normal way; that there are different heavens for persons of different degrees of holiness. While it purports to have been originally written several centuries before Christ, Jesus is mentioned often. It often mentions horses & wheeled carts which American Indians didn't have before 1492. Mark Twain said the Book was an insipid mess, "Chloroform in print."

Brigham Young
Mormons: Christians severely persecuted Mormons. Smith excommunicated most of his original followers and was shot by an anti-Mormon mob in Illinois. Brigham Young then with several wives, led Smith's followers to Utah. Families were large. Blacks couldn't become priests. Mormonism says all men will eventually be restored to a state of happiness. Mormons, like many Christian sects and Jews believe in an imminent Second Coming (end of the world).

Geology: Charles Lyell (1797-1875), Scot, wrote Principles of Geology, a cautious history of geology and a description of the inorganic physical processes at work in the world, such as volcanoes, erosion, earthquakes. It built on Playfair's simplification of Howell's 1795 work. Everything that happened in the past could be explained by events still going on, uniformitarianism. Darwin read Volume 1 of Principles before his departure on the Beagle in 1831.

Daniel Webster
The people's government [is] made for the people, by the people, and answerable to the people.

Philosophy: Auguste Compte (1798-1857) French, a founder of sociology & positivism (recognizes only positive facts & observable phenomena without inquiry into ultimate origins). Cours de philosophie positive / The Positive Philosophy, 6 volumes 1830-42, is his manifesto for positivism. There can be no real knowledge but that which is based on observed facts. In Discourse on the Positive Spirit, he said all branches of knowledge go through three stages, 1. theological / fictitious, 2. metaphysical / abstract, & 3. scientific / positive. Said, use quantitative data to make decisions. "Religion is an illusion of childhood, outgrown under proper education." He advocated studying the history of science.

Biologist: Charles Darwin (1809-1882), studied medicine at Edinburgh, then theology at Cambridge, spent 1831-1836 on the British surveying ship, the Beagle, sailing the S. Atlantic & the S. Pacific, then west around S. Africa back to England, collecting specimens & taking notes.(He spent 3+ years on land, 18 months at sea.) Before and while at sea, Darwin read Volume 1 of Lyell's Principles of Geology, including its speculations on how changes in flora and fauna may be due to their isolation and whether species die and others take their place.) Specimens and notes he shipped home during his journey were published and made him a well regarded naturalist.(more 1838)

Charles Lyell
Geology, biology, botany: Lyell's Vol. 2 of Principles of Geology dealt with processes like climatic change which might cause species to appear or disappear. (Darwin read it 1834 in Montevideo.) Lyell theorized that changes in flora and fauna might be explained by their isolation in separate and different ecological circumstances, and, regarding fossils, he wrote, "In the universal struggle for existence, the right of the strongest eventually prevails." He was referring to competition among species, as he had seen from fossils that various species had
disappeared, as opposed to Darwin's later 1859 theory of Natural Selection emphasizing competition among individuals within a species. (In 1859, Darwin praised Principles of Geology in his The Origin of Species.) Volume 3 (1833) said that the Earth must be millions of years old to create the present world. The Anglican Church strongly opposed Lyell's theory of the extreme age of the Earth. So he was socially ostracized, but became famous.

1832 Goethe published Part 2 of Faust, depicted the world to come. Progress, ruthlessness, the old destroyed. He died.

1833 Political theory: Leopold von Ranke (1795-1866), German historian: God said every nation has a special moral character; one should strive to fulfill the idea of that state, “Germans, reject the French revolution.” Every age is unique, and should be judged in its own context. England bought and freed all slaves in the British Dominions. Very expensive. It had banned the slave trade in 1808.

1835 Americans like money, change, religion

1835 Political Theory: Alexis de Tocqueville (1805-1859), a young French nobleman, traveled around America and wrote Democracy in America, saw clearly that progress toward equality was irresistible, admired its democracy. Though a nobleman, he saw that the privileges of nobility had to end.

“If I know of no country where the love of money has taken stronger hold on the affections of men 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.”

“There have been few religions in the world as deadly to men as that of Muhammad... the principal cause of the decadence so visible today in the Muslim world,... its social and political tendencies are in my opinion to be feared, and I therefore regard it as a form of decadence rather than a form of progress in relation to paganism itself.

(In 1848, Tocqueville told the Constituent Assembly that socialism violated human nature and property rights.)

1838 Darwin returned to England. Due to his writings sent from abroad, he became the Secretary to the Geological Society and joined the Royal Society and other scientific societies. He read widely preparing his notes for publication. He had seen finches in the Galapagos Islands whose diet was seeds with short stout beaks and finches on islands where the finch would have to burrow into crevices to find food, with long narrow beaks.

1838 Darwin read Malthus’s Essay on Population (“Population will increase beyond the means of subsistence,” thus there is always a struggle/competition for food). Malthus’s insight was the key to the riddle of species change. From it, Darwin developed the theory of Natural Selection, that in the struggle for food, some species die and others come into existence, and, within a species, the most fit to survive, survive and reproduce.

Darwin’s wife was very devout. So, he planned to publish his theory only after he died. In 1839, Darwin published Journal & Remarks on the geology, botany, & zoology he saw on his trips. He continued to publish scholarly articles on geology, biology, & botany, principally geology, his specialty. (more Darwin 1844, 1859,1871)

1838 Astronomy, physics: Frederick Bessel (1784-1846) German, measured the distance to the star 61 Cigni by triangulation, deduced it was 10 light years away. He also measured other stars and saw that properties like temperature and chemical composition of stars and the Sun were alike; so our Sun is a star.

1839-76 Islam, Tanzimat / Modernization of the Ottoman Empire: The Ottoman Empire was shrinking and deteriorating. Turkish reformist sultans Mahmud 2 and Abdul Mecid and various European-educated bureaucrats, principally Turkish, influenced by the Enlightenment in Europe, sought to modernize the empire to save it. They instituted reforms like restricting Sharia law to family matters, establishing a parliament, a Land Code, telegraph service, a railway network, equal legal treatment for non-Muslims, schools to train government workers, a postal service, modern universities, a Commercial Code, a national anthem, a Ministry of Healthcare, European style courts, an Academy of Sciences, the School of Economic and Political Sciences, a stock exchange, a Central Bank, reorganizing the finance system and the Civil and Criminal Codes to the French model, reorganizing the Army, taking a census (male citizens only), issuing identity cards, and abolishing slavery. (See 1886 al-Afghani)

1840 Chemistry: Henri Hess said that the amount of heat developed or absorbed in a chemical reaction was always fixed, inferring the laws of thermodynamics also applied to chemical reactions. This started the science of thermochemistry.

1840 Philosophy: Thomas Carlyle (1795-1881), Rector, U. of Edinburgh, “What is philosophy but a continual battle against custom.” “The greatest law of culture is, let each become all that he was created capable of being; expand, if possible to his full growth...” Said the Koran was “wearisome confused jumble, crude...stupidity.” He defended slavery as due to Negroes’ inferiority, said West Indies development was due solely to British ingenuity.

William Whewell, Brit., coined the words scientist, physicist, ion, cathode, consilience, & uniformitarianism.
1840 Pierre Prudhon (1809-65), “Slavery is murder...Property is theft, the suicide of society...Communism is inequality.”

1841 Philosophy: Ludwig Feuerbach (1804-1872), Bavarian, critical of Hegel’s idealism. “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. Re an unknowable God, “To deny all qualities of a being is equivalent to denying the being himself.”

1842 Physics: Christian Johann Doppler (1803-1853), Austrian, discovered that an approaching sound source bunches up the sound waves it emits, thus has a higher pitch to man’s ear than the sound from a stationary or departing sound source, where the sound waves are spaced further apart. The more sound waves hit the ear per second, the higher the pitch to the ear. This is the Doppler Effect. Sound goes thru air (at sea level & 0 centigrade at c768 mph, through water at 3,302 mph; & through steel at c13,636 mph). Sound waves are not electromagnetic waves. Doppler predicted the secondary effect would apply to electromagnetic waves (including light waves). The only electromagnetic waves visible to man are light waves, which Newton showed are made up of a spectrum of varying frequencies/different colors. (Doppler’s prediction was confirmed in 1848 by Hippolyte Fizeau. See 1848 Physics).

1842 G J Holyoake, British social reformer, jailed for 6 months for saying he didn’t believe there was such a thing as God.

1842 Julius Robert von Mayer (1814-1871), German doctor & physicist, suggested the principle of the conservation of energy. In an isolated system, the total mechanical energy of objects that interact with each other remains constant. Work & heat, although different forms of energy, can be transformed into one another. Now the First Law of Thermodynamics (1847). Mayer thought that the source of all energy was the radiation of light and heat from the Sun.

1843 James Joule (1818-1889), Brit., said X amount of work makes X amount of heat. The amount of energy 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 energy is measured in watts. A hot body contains much thermal energy, a cold body less.

1844 Religion: Baha’u’llah, Persian, founded the monotheistic Baha’i faith, emphasizing the spiritual unity of all mankind. Its three core principles, the unity of God, the unity of religion, and the unity of mankind. Baha’i also 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. Adherents consider other religions as manifestations of God who brought teachings suitable for their time, Baha’u’llah fulfills the end-time prophecies 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.

1844 Philosophy: Schopenhauer (ref 1819) said the laws of thought could be reduced to 2; the law of the excluded middle and the principle of sufficient reason. Regarding free will, he said, Man can do what he wills, but he cannot will what he wills.” He was paranoid and hated women, liked demigods and dogs as they were free from the failings of men.

1844 Evolution: Scot Robert Chambers published anonymously Vestiges of the Natural History of Creation. All creatures, (even man), evolved from simpler creatures following God given laws. It was popular. Darwin & Wallace both read it.

1844 Biology: Robert Remak, German, discovered that cells divide to create new cells, second greatest discovery in biology.

1845 Judaism: A conference of reformed rabbis influenced by Hegel met in Berlin to discuss reforming Judaism. Reformed Judaism became the largest Jewish group. (Overtly secular Judaism became a significant group in the 20th century.)

1845 Political theory: Max Stirner (1806-1856), 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.” Said, “God (supernatural explanations for phenomena) is dead.” “Freedom cannot be granted. It must be taken.”

1845 Political Theory: Friedrich Engels’s The Condition of the Working Class in England described their misery, despair, squalor, starvation. 33% of English men and 45% of English women could not write their names. (more Engels 1871)

1846 William Morton successfully demonstrated ether as an anesthesia for surgery, of incalculable benefit to patients.

1846-1907 William Thomson (1824-1907) entered U. of Glasgow at 10, studied in Paris, London, graduated from Cambridge, 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, he wrote, “Physics is the science of force.” 5 years later he wrote, “Energy is the primary principle.” This advance came from: 1. studies of the motion of individual particles including planets, and 2. from masses of particles like steam engines.
Measure, then you know.

Thomson: “When you can measure what you are talking about and express it in numbers, you know something.” He invented a depth sounder, plus did pioneering theoretical work in electromagnetism, thermodynamics, 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 that allowed telegrams to be sent across oceans. Wrongly, he said the Earth’s age was 24 million years. (more at 1848, 1852, p.136)

1846 Philosophy: Soren Kierkegaard (1813-1855) Dane. Father of existentialism. He reacted to Frederick Schilling’s version of German idealism. He thought the Idealists claims were extravagant and adopted a more skeptical view in which universals are beyond the reach of Man. He similarly saw God as an entity.

Man could not know science. Philosophy (especially rationalism and empiricism) are vain and pointless. Only individuals matter; existence is individual in character. If God could be rationally proven, his existence would be unimportant to humans. Christendom has done away with Christianity without being quite aware of it.

As death is certain, every choice has infinite worth, every moment is a unique occasion for decisive action; each individual achieves his being through decisions. What really matters is the pathos of existing. Men leap to faith when they believe something without evidence (now known as the leap of faith). Said there were three groups of men, aesthetes, who want entertainment, ethical men, who live for duty, religious men, who live to obey God

Kierkegaard quotes

c1847+ Thermodynamics: that branch of physics pioneered by Carnot (ref 1824) dealing with the interconversion of the forms of energy, thermal energy, electricity, magnetism, and light. A body does not contain heat, only thermal energy. Heat is energy transferred from a warmer body to a cooler one. Heat transfers by conduction, convection, or radiation. All other forms of energy can be converted 100% into heat. Heat cannot be converted with perfect efficiency.

1847 Laws of Thermodynamics

First Law of Thermodynamics, the “conservation of energy”: Suggested first by Hermann von Helmholtz and developed by James Joule and Rudolf Clausius, is the principle of conservation of energy for thermodynamic systems. Namely in a closed system, or the universe, energy is indestructible and constant, it cannot be created or destroyed. It may, however, change its form, i.e., electricity to heat to light, etc. Work and heat are both ways to transfer energy from one form to another. (Einstein in 1905 showed the equivalence of matter & energy.)

Entropy

Second Law: 1850, Clausius, One of the most important single laws in science “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. called entropy, and it cannot be recovered. Heat energy flows only from a hotter body to a cooler one. Some energy is available, some is not, but it is still somewhere. In the universe, stars are burning up/fusing, entropy is always increasing, heat is draining into a lake of equality, space, where it’s no longer accessible. (The Third Law discovered in 1906; 4th law, zeroth law, see Index) At this time, energy and mass were considered two separate concepts, each in a balanced world in itself. Until this time no one knew exactly what heat was. The laws of thermodynamics were still valid as they were based on measurements.

1847-49 During Ireland’s famine, Brits’ unofficial policy was to starve Irish. Nassau Senior. Queen Victoria’s advisor, told her existing confiscations of Irish crops wouldn’t kill more than 1 million in 1848. “That will scarcely be enough to do much good.” Charles Trevelyan, heading the relief effort, said the famine was an effective way to reduce the Irish people.


19th Century Social Critics:

Twain

Flaubert

Melville

Victor Hugo de Balzac

Rudyard Kipling

Anatole France

Oscar Wilde

1847-99

Numerous thinkers criticized the narrow-minded, hypocritical mentality of 19th century Western society. For example:

Charles Dickens (1812-1870) Dombey and Son. A wealthy financier, has a sickly son who asks what good is money. The father patronizes the boy, "Money can do anything." But in the end, money cannot save the boy nor the financier. Only a neglected daughter survives, whom he now sees is worth everything.(1848) Also said, Law is an ass, an idiot.

Mark Twain, Innocents Abroad. He went to Europe, found Europeans pretentious, petty, supercilious, no dignity (1869)

Gustave Flaubert (1821-80) Madame Bovary, adulterous wife tries to escape the banalities of provincial life (1856)

Herman Melville (1819-1891) Moby Dick “Better sleep with a drunken cannibal than a sober Christian.” (1851)

Henrik Ibsen. An Enemy of the People, attacked the complacent majority of a town that put money over truth (1882)

Honore de Balzac (1799-1850) The secret of a great unexplained success is a crime that has not been found out.

Victor Hugo (1802-1885) Les Miserables (15 year sentence for stealing a loaf of bread) described social injustices.

George Eliot (pen name of Mary Anne Evans) Middlemarch, fiction, explored great themes, class, political reform, education, status of women, marriage, idealism, religion. Known as first fully adult work of fiction (1874)

Rudyard Kipling (1865-1936) “For it’s Tommy this, an’ Tommy that, an’ Chuck him out, the brute. But it’s Savior of the country when the guns begin to shoot.” “The Colonel’s lady and Judy O’Grady are sisters under their skins.” (1895) He also wrote of the different mentality outside the West, “And the end of the fight is a tombstone white with the name of the late deceased, And the epitaph drear, A fool lies here, who tried to hustle the East.” (1892)

Anatole France (1844-1924) “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. 1894, “Moderates are always moderately opposed to violence.”

Oscar Wilde (1854-1900) Irish. “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....Science is the record of dead religions...Thinking is the most unhealthy thing in the world. People die from it, just as they die from any other
Thomas Huxley, having become "sick of the dilettante middle class," established Workingmen's Lectures at the Royal College of Mines, which Huxley transformed into prominence, taught basic science directly to the people.

Emile Zola (1840-1902), "J 'accuse" exposed French anti-Semitism in the case of Capt. Alfred Dreyfus. (1898)


Edward Potts Cheney, Social and Industrial History of England, "The law locks up both man & woman, who steals the goose from off the common. But lets the greater felon loose, who steals the common from the goose" (1901)

Edith Wharton, The House of Mirth, written to reveal "high society," all its shoddiness, vulgarity, & selfishness. (1905)

1848 Absolute Zero

Physics: 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 William Thomson quantified it to be minus 273.16 Celsius. Thus, at a fixed volume, a gas's pressure increases 1/273 each Celsius degree increase. Or, at fixed pressure, the volume increases 1/273 for each Celsius degree increase. The 3 iterations of the pressure / volume / temperature relationship of gasses are P=VT, or V=P/T, or T=P/V. Thomson suggested temperature be measured in Celsius degrees beginning at the absolute zero, so water would freeze at 273 Kelvin (0 Celsius) & boil at 373. (Thomson was made Lord Kelvin in 1892 so temperature from absolute zero is now called Kelvin degrees, which are the same magnitude as Celsius / centigrade degrees).

1848 Marx, A Spectre is Haunting Europe

History, Political Theory: Karl Marx understood the forces of history, thus he could predict the character of the world to come. He was influenced by the social ideas from the French Revolution, the economic ideas of the industrial revolution in England, the philosophical ideas coming out of Germany. He said philosophy is an interpretation of the world in order to change it. And the history of all hitherto existing society is the history of class struggles....that the bourgeoisie in 100 years had created more colossal productive power than all previous generations together. Marx called his version of Idealism "historical materialism." He used some of Ricardo's (ref.1817) ideas to support socialism.

The key to materialism is understanding the economic forces that determine human interest. He focused on the process the bourgeoisie had invented, i.e., the money process, new ideas supplanting older ones constantly, not the achievements (factories, bridges, railroads). That is, the bourgeoisie had started a permanent revolution. This needed men and women who liked change. Marx forced future historians to consider that economic relationships were basic forces in history. For Marx, differences among humans were due to environmental factors.

Is Society a Community or a Free for All?

Political Theory: A basic theme in political theory is whether a society is (or should be) an organic whole where all contribute to the welfare of all or if it is simply a collection of individuals each seeking the most benefits for themselves. All political theories can be understood as representing one or the other of these views.

Marx said that the state is the ideologically legitimized power of the ruling classes over the working classes; its disappearance under genuine egalitarian & advanced productive & social conditions is thus necessary by definition. Describing democracy, he said, "The oppressed are allowed once every few years to vote which particular representatives of the oppressing class are to represent & depress them." To him, economics was the basic human science.

Marx also denigrated religion. "Religious suffering is...the expression of real suffering & a protest against real suffering. It is the opium of the people." Religion was used in a capitalist society to keep the masses in their place by offering hope in a next life. Christianity justified the slavery of antiquity, glorified servitude in the Middle Ages, and equally now...how to defend the oppression of the proletariat, thought they make a pitiful face of it.

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. The Communist Manifesto, "The proletarians have nothing to lose in this revolution but their chains. They have a world to win. Workers of the world, unite." He saw how the ruling class exploited & controlled the lower classes and called on workers to throw off their chains. In recognition, today, all serious history encompasses economic history.

1848 Dogma vs. reason: Antonio Rosmini, priest, Prime Minister of the Papal states, wrote The 5 Wounds of the Church, 1. remoteness of the clergy from the people, 2. uneducated priests, 3. disunity & acrimony among bishops, 4. Church enslavement to wealth, 5. dependence of lay appointments by the state. So, put on the Index & forced to retire.

1848 Physics, optics: Armand Hippolyte Fizeau (1819-1896), French, built a device with a mirror 8K from the light source to measure the speed of light. He was just 5% high. He also confirmed Doppler's 1842 prediction that a Doppler effect would apply to electromagnetic waves, not just sound waves. That is light from stars receding from Earth would appear redder than light from approaching stars as all electromagnetic waves (including light waves) from a receding source would be stretched out (like Doppler's sound waves) and thus reach Earth at a slightly lower frequency. In the case of visible light, the red end of the light spectrum has a lower frequency than the blue end of the light spectrum and thus light from a receding source appears redder. This is known as the red-shift. Conversely, light approaching a viewer appears bluer, the blue-shift. Light's spectrum is infra-red, red, orange, yellow, green, blue, indigo, violet, ultra-violet.

Brigham Young's Book of Mormon Sermons, "Shall I tell you the law of God in regard to the African
Young: Slavery is divine

race? If the white man who belongs to the chosen seed mixes his blood with the seed of Cain, the penalty, under the law of God, is death on the spot." Young said slavery was a "divine institution, and not to be abolished until the curse on Ham is removed." Slaves were not to be preached to, or to be interfered with in their servitude.

1851 Political Theory: John Stuart Mill (1806-1873), Brit., likely the most important 19th century English speaking philosopher. Intensely home-schooled (read Latin at 3, Greek at 8) by his father, Scot philosopher James Mill, and godson of Bentham (ref. 1789), so became a devotee of utilitarianism. Mill feared "the tyranny of the majority." Due largely to his bright wife, Harriet Taylor, he favored women's rights. They wrote The Enfranchisement of Women and other works advocating equality of treatment of the sexes. "The dictum that truth always triumphs over persecution is one of those pleasant falsehoods that men repeat... but which all experience refutes." (More Mill, 1859, 1863, 1874)

1852 Physics: Henri Giffard, flew a cigar shaped hydrogen balloon for 20 miles over Paris with a 3 HP steam engine.

1852 Physics: Joule and William Thomson showed that an expanding gas consumed energy, & thus its temperature would drop, the basic principle of refrigeration. And that the heat capacity of water is greater than the heat capacity of mercury.

1852 Non-Anglicans were allowed to attend Oxford. Allowed at Cambridge in 1856. In1871, Non-Anglicans could teach there.

1853 George Cayley, Brit, founder of aerodynamics, built a glider with lift and stabilizer controls, first manned glider flight.

1854 Medicine: Dr. John Snow, saw that most of the cholera in London was near one well near a sewer pipe. He deduced cholera was caused by contaminated water. He had the handle taken off the well’s pump. Cholera declined at once.

1855-59 James Clerk-Maxwell PHYSICS: James Clerk-Maxwell (1831-79) Scot., showed that white light would result from red, green, & blue lights. Published On Faraday's lines of force, saw they could be put into mathematical equations. He did so. Faraday thanked him. The paper showed how electricity and magnetism were related. In 1856, he said Saturn’s rings were many small satellites. The Voyager space ship confirmed this in the 1980s. In 1859, he added to the kinetic theory of gas, said gas molecules bounce off each other causing pressure.

1855 Biology, Evolution: Alfred Russel Wallace (1823-1913), an accomplished self-educated naturalist, with whom Darwin had corresponded regarding ideas on evolution, published an article in the Annals and Magazine of Natural History that posited that new species evolved from preexisting ones.) It was very similar to Darwin's then unpublished theory which Darwin termed Natural Selection. Wallace was impressed by Malthus and Chambers's Vestiges of the Natural History of Creation. Darwin continued work on his book on natural selection.

1856 Neanderthals, an extinct Hominid species (brain equal or larger than Homo sapiens) were found in the Neander valley / tal in Germany. Homo sapiens today are the virtually same physically as they were 50,000+ years ago, but taller.

1856 Louis Pasteur (1822-95) heated wine, not to boiling, to kill bacteria, kept it from souring; later did the same for milk.

1857 Dred Scott decision: The US Supreme Court, Chief Justice Roger B. Taney, said descendants of slaves were not citizens; they were property. "The right of property in a slave is distinctly and expressly confirmed in the Constitution," The slave states wanted to extend slavery to the new western territories. The 1850 Fugitive Slave Act permitted slave owners to capture escaped slaves in "free" states. John Brown's 1859 raid at Harpers Ferry galvanized abolitionists.

1857 Herbert Spencer (1820-1903), Brit, biologist, philosopher, libertarian, 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, & human cultures and societies. He contrasted creationism & evolution, argued strongly for evolution, saying species had been modified by circumstances. Little notice was paid.

1858 Rudolf Virchow, Prussian radical reformer, published Cellular Pathology. The cell is the fundamental unit in health and in sickness. Diseases are disturbances of living cells. He was also a founder of the new science of pathology.

Biology, Evolution: Alfred Wallace sent Darwin a more complete paper on his theory. He saw patterns among creatures. He even used the phrase, the best fittest survive, asking that it be given to Lyell for the Linnean Society. So Darwin & Lyell had both Wallace's paper & a portion of Darwin's 1844 unpublished essay on Natural Selection read to the Linnean Society & published in its journal. There was no reaction. Darwin continued to work on his book.

1859 Gustav Kirchoff & Robert Bunsen, Germans, built a spectroscope, saw that every element emits a distinct set of wavelengths of light. The Sun's spectrum had dark lines. They deduced it represented sodium and other elements. So figured such elements existed throughout the universe. Spectroscopes can also determine a star's temperature.
1859

Political Theory: Mill's (ref.1851) On Liberty, disputed Hobbes. "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

John

Stuart

Mill

crushes individually is despotism, by whatever name...Prohibit nothing on the grounds that it harms a voluntary participant. Liberty consists of doing what one desires." Men can't sell themselves into slavery. But, men can be compelled to pay taxes & show up in court. These are based on utility, not on natural rights. Speech cannot be censored as it may contain some truth, & erroneous ideas may be exposed & abandoned. (More Mill 1863 & 1874)

1859

Biology, evolution: Darwin completed his book and in November 1859, published the 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 through natural selection." Anthropologist Loren Eiseley considers learning the creation of the evolutionary process the greatest inductive achievement of science.

Darwin made 3 basic points: 1. All organisms produce more offspring than can survive. 2. Offspring vary. 3. Variances are passed on to their offspring. He did not know what caused variances in individual species, the theory's chief weakness, but knew that those variances that enabled the organism to survive in its particular environment survived & reproduced, passing along that variance, and that organisms with variances that hurt the organism's chances to survive simply died out. Darwin did not consider any variance "progress," merely adaptations for survival in a specific local environment. Man has advanced immensely intellectually, but without physical variance for at least 50,000 years.

Darwin called the process of change Natural Selection to distinguish it from Artificial Selection, i.e., eugenics, an idea at least as old as Plato's Republic, selective breeding, then and now practiced by farmers to improve their livestock. Darwin credited Lyell and Malthus in Origin. Darwin first accepted Lamarck's 1809 seemingly reasonable (but incorrect) theory that parents pass on characteristics they acquired during their lifetime. The actual cause of change, random genetic mutations, was not known until 1899. Origin was detailed and comprehensive. Darwin even explained how complex organs of seeming irreducible complexity, such as the eye, evolved from less complex organs. Origin was mainly concerned with physical characteristics but did include a chapter on instinct, i.e., behavior, as inherited.

The idea of species changing was not new. The Enlightenment was based on the idea of Man changing & improving culturally. Earlier men had considered concepts of changing in species, including Anaximander, Lucretius, al-Jahiz, de Buffon, Geoffroy St. Hilaire, Lamarck, Lyell, Francis Bacon, Cuvier, Laplace, Treviranus, Chambers, Robert Grant, Spencer, de la Mettrie, and Erasmus Darwin. But Darwin amassed a huge amount of scientific evidence for changes of species by Natural Selection. Origin of Species did not use the word "evolution."

The theory of Natural Selection was the single most important scientific event of the 19th century. It showed that natural causes and not a supernatural being created complex organisms and new species. Hegel had put evolution into philosophy. Marx had put it into politics. Darwin explained how it worked for plants and animals, i.e., Natural Selection in the context of Malthus's world of a struggle for food. Origin sold 25,000 copies in two years, a huge amount.

Different species evolved as some of one species best fitted to different environments reproduced the most & evolved into different species. On the Galapagos islands, Darwin saw different species of finches on different islands as different shaped beaks could best get the different foods available on such islands. Different species and sub-species evolved in different parts of the world in isolation from other parts of the world (separated by water or just distance).

In the 4th edition of Origin, Darwin said Buffon (ref.1749) was the first author in modern times to treat species change scientifically. Darwin erred in believing in blended inheritance. Gregor Mendel refuted that in 1865.

Origin did not mention humans. The common Western belief at the time held that all races of men were separate species, the result of different acts of divine creation, polygenism, & of course, that the white race was superior to all others. Polygenists incorrectly said that mixed race children would be sterile. Evolution by Natural Selection destroyed the Design Argument by showing that organisms that are exquisitely constructed came about through natural processes without a designer (like Hume's 1779 argument). Darwin made science embrace the centrality of change.

Christian reaction was fierce

Dogma vs. reason: Bishop Samuel Wilberforce of Oxford wrote that Natural Selection was "absolutely incompatible with the word of God;" that the fall of Adam explained strange species. It was a "rotten fabric of guess & speculation."

English Catholic Cardinal Manning declared his abhorrence of Darwin's theory. With Vatican approval, he set up the Academia, to fight Darwinism that "threatens even the fragmentary remains of Christian belief in England."

1860

Dogma vs. reason: Andrew Dickson White in 1896 wrote, "Origin came "into the theological world like a plough into an ant-hill. Everywhere those thus rudely awakened from their old comfort & repose swarmed forth angry & confused," French Monseigneur Segur, "Darwin's ideas come from Hell." 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." A publication of the Episcopal Church in the US said, "If [Darwin's] hypothesis be true, then is the Bible an unbearable fiction;...then have Christians for nearly 2,000 years been duped by a monstrous lie.

Dr. Charles Perry, Lord Bishop of Melbourne, said that Chambers, Huxley (a big fan of Darwinism), and Darwin's
object was "to produce...a disbelief in the Bible." The Catholic World said that Darwin is the "chief mouthpiece of that infidel clique whose well-known object is to do away with all idea of a God." Anglican Rev. Walter Mitchell of the Victoria Institute, "Darwinism endeavors to dethrone God." French Abbe Fabre d'Envieu said that any doctrine other than that of the fixity and persistence of species was absolutely contrary to Scripture. Swiss theologian Rougemont called for a "crusade against the obnoxious doctrine." German Lutheran theology professor Christoph Ernst Luthardt, "The idea of creation belongs to religion and not to natural science; the whole superstructure of personal religion is built on the doctrine of creation." A professor of geology at the Syrian Protestant College commented favorably on Darwinism. He was fired. Alfred Russel Wallace saw Darwinism as an affirmation of God.

"Most of the attacks on Darwinism were clergy saying that it contradicted Scripture, not scientists saying it was wrong. Darwin’s most eminent scientific critic was biologist Richard Owen, a devout Anglican, who believed that each species had its own life force, an organizing energy, which could not transmute into a different species. Origin of Species: had severe religious, political & social consequences, & gave rise to debate around the world. Origin dethroned Man from his self-created concept of himself at the center of the universe.

Finally, in 1860 (after Avogadro died) chemist Stanislao Cannizzaro at the Karlsruhe Conference, convinced the delegates of Avogadro’s theory. That is why it appears here in this history. [1cc of any gas, at zero Celsius (32 F) at atmospheric pressure contains 2.68986 X 10^18 atoms or molecules, now known as Avogadro’s Constant].

Biology: Thomas Huxley (1825-1895), Brit, biologist, brilliant, elected to the Royal Society at 26, articulate advocate of Darwinism, was a great motivating force behind 20th century skepticism. He wrote Man’s Place in Nature, said, "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...Science is simply common sense at its best; that is, rigidly accurate in observation and merciless to fallacy in logic..." Irrationally-held truths may be more harmful than reasoned errors as errors can be corrected by better reason.

Darwinism: At a large public meeting of the British Association for the Advancement of Science at Oxford, Bishop Wilberforce, Huxley, Joseph Hooker, & others spoke on Darwinism. Wilberforce had publicly said he would "smash" Darwin & had published, anonymously, that 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." According to eyewitness Balfour Stewart, Wilberforce said to Huxley that he had been told 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.

Huxley replied, "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.

Hooker, a future president of the Royal Society, gave Wilberforce a more scientific explanation and said Wilberforce misunderstood Darwin’s theory, could not have read Origin, and was ignorant of the issues under discussion. Hooker won on science; Huxley won on style. Oxford was preeminent in opposing scientific advances

Like heliocentrism, evolution by natural selection had severe social & psychological consequences to mankind. Seven prominent Anglican clerics published Essays & Reviews, describing statements in the Bible that science had shown false. Wilberforce said the book “tended toward infidelity, if not to atheism,” the writers “guilty of criminal levity... wanton...false...atheistic.” Similar to Essays & Reviews, Brit journalist William Burr published, anonymously, Self-Contradictions in the Bible, describing 143 passages in the Bible contradicted by other Biblical passages.

Botany, Biology: Matthias Schleiden (1804-1881), a German biologist, in 1839, had noted that plants were composed of cells. Theodor Schwann (1810-1882), a German physiologist, noted cells in animals. Together they wrote that all vegetable and animal matter was cellular; all cells have a membrane, a nucleus, and cell body and are the elementary particles of all plants and animals, the basic principles of cell theory. This was accepted only in 1860 (why it’s here in this history) when Louis Pasteur (ref 1856, 1862) showed that life comes from preexisting cells.

Electromagnetism Timeline 1860-1897: The Victorian Age unified the domain of energy. Earlier Timeline at p.123. 1860 Johann Geissler, German, showed that gas in a tube glows from an electric current (florescent light bulb) 1861 Philip Reis developed a crude “telephon” capable of changing musical sounds to electricity and back again. 1861-62 Maxwell (ref 1855) made a conceptual model for electromagnetic induction. Published On Physical Lines
of Force, that reduced all knowledge of electricity to 20 linked differential equations, made the first color photos. In 1862, said electricity goes about as fast as light; so light travels in the same medium as electricity.

1863 France built a practical fax line on the telegraph line between Paris and Lyon. In 1867 extended to Marseilles.

**James Clerk-Maxwell**

1864 Maxwell's *A Dynamical Theory of the Electromagnetic Field*: “Light and magnetism are affectations of the same substance, and that light [goes] according to electromagnetic laws,” i.e., light is an electromagnetic wave. He built on the ideas of Faraday and unified magnetism with electricity; posited that electricity, light, and magnetism, were all electromagnetic waves of different wavelengths traveling at 310,740,000 meters/sec; showed their speed was the combination of an electrical “constant” and a magnetic “constant.” He introduced “electromagnetic fields” to replace Faraday's force fields. Maxwell measured microwaves, then smaller infrared waves, then visible light, then ultraviolet, then X-rays, then the shortest, gamma rays. He predicted longer electromagnetic waves. (Heinrich Hertz confirmed this in 1887 when he discovered radio waves). Visible light constitutes a tiny part of the electromagnetic spectrum, and acts as a wave (Huygens’s 1678 idea). Maxwell said that a change in a magnetic field creates an electric force & conversely, change in an electrical field creates a magnetic force.

1866 Siemens GmbH built the first practical dynamo (device to convert mechanical power into electricity (by setting conductors, usually coils of copper wire, to rotate in a magnetic field.) So a car’s generator and starter motor is one device. Direct current from the car’s battery is applied to a coil that can rotate. Magnets surround the coil. The current from the battery creates a magnetic field that pulls the coil around (rotates) inside the magnets. This rotation starts the car’s engine, which when then running on gasoline turns the device’s axle that then generates electricity that is put back into the car’s battery. All generation of electricity is based turning a coil surrounded by a magnet.

1866 *The Great Eastern* laid a telegraph cable across the Atlantic. William Thomson was an advisor aboard.

1871 Antonio Meucci, Italian, got a preliminary US patent for an electric telephone, *teletrofono*.

1873 Maxwell (ref 1855) summed up all electricity in his *Treatise on Electricity and Magnetism* that told all about electricity and magnetism and their unity. The electromagnetic potential was the center of his theory. He developed a quantitative expression that linked the fundamentals of electrostatics and electromagnetism with the speed of light.

1876 Alexander Graham Bell, patented an “improvement on telephony” crediting Reis’s and Meucci’s prior work.

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.

1877+. Thomas Alva Edison (1847-1931) invented the phonograph, printing telegraph, alkaline battery, mimeograph, kinetoscope, and c1,300 other electrical inventions. He perfected-not invented- the incandescent bulb.

1881 Oliver Heaviside replaced Maxwell’s electromagnetic potential field by “force fields” as the heart of electromagnetism. He simplified Maxwell’s 20 equations to four differential equations, now called “Maxwell’s Equations” or *Maxwell’s Laws*, discovered by others, but Maxwell realized they were the heart of the theory of electricity and magnetism. The meanings of the four differential equations are:

1. The electric field leaving a volume is proportional to the charge inside (Gauss)
2. There are no isolated magnetic poles. (If there’s a positive pole, there’s a negative pole.) The total magnetic flux piercing a closed surface is zero (Gauss’s law for magnetism)
3. The voltage accumulated around a closed circuit varies by the time rate of change of the magnetic flux it encloses.
4. Electric currents & changes in electric fields vary by the magnetic field circulating around them. Ampere/Maxwell

1882 Edison built a direct-current inefficient expensive electric power distribution system in NYC, 59 customers.

1883 Nikola Tesla (1856-1943), Serbian-American, built an alternating-current (AC) induction motor with no solid connection to the rotating part, making it more reliable. In 1887, he sold it to Westinghouse. AC transmits current long distances far cheaper than Edison’s direct-current system, thus became the worldwide standard for electric motors & distribution systems, but only after bitter, expensive, dishonest, protracted lawsuits & false publicity from Edison.

1887 Tesla studied x-rays and sent Roentgen a photo of his hand bones. In 1891, he demonstrated wireless transmission of electric energy, called the *Tesla effect*. His inventions were crucial to the taming of electricity.

1887 Heinrich Hertz, German, invented a device to make and receive electromagnetic radio 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 proved Maxwell’s theory that longer waves existed. They were radio waves, *Hertzian waves*, and like all electromagnetic waves, travel through space and metal at the speed of light. His discoveries led to the wireless telegraph. 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 experiments caused physicists to make a radical shift in their views about electromagnetism from “instantaneous action at a distance.” (Of course, very very close to instantaneous.)
1890 AEG GmbH developed Tesla’s alternating-current motor and the generator, so power plants could be built.

1891 Sebastian Ferranti, British, designed and built the first power generating station and distribution system.

Roentgen
1895, Wilhelm Roentgen, German, made & detected X-rays, an electromagnetic wave, the birth of nuclear physics.

Marconi
1895 Guiglielmo Marconi, using a Tesla circuit sent wireless radio waves. Then in 1901 sent across the Atlantic.

Thomson
1897 J J Thomson discovered electrons, thus started the electrical theory of the atom, i.e., protons and electrons in an atom; founded modern atomic physics. First experimental establishment of the particulate theory of matter.

Timeline #
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 equals mass [of one object] times mass [of another object] divided by the square of the distance.” In contradiction to this, Faraday and Maxwell introduced an entirely new kind of physical reality, namely a field of force.

Introducing of these new realities gave the enormous advantage that, first, the conception 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 be assumed, and only masses and motions be regarded as realities.” Maxwell & Faraday’s work was “the first fundamental advance in theoretical physics since Newton.

Einstein elaborated, “What made [Maxwell’s] theories seem 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.” Richard Feynman later said that in the long run, Maxwell’s discoveries will be judged the most significant event of the 19th century.

1861 Southern states seceded to protect slavery. Civil War. The value of slaves constituted 50% of Southerners’s wealth.

1862 In Education, Herbert Spencer (ref. 1857) said, “Science is organized knowledge.” (repeating Kant) “Science concerns itself with the coexistence and sequences among phenomena; groups these at first into generalizations of a simple or lower order, and raising gradually to higher and higher and more extended generalizations. His 1862 First Principles said that applying natural selection to cultures and people, not just to individual, was useful. “Science has forced religion to give up one after another of its dogmas, of those assumed cognitions of the world which it could not substantiate.”

“Science thus trespassed on the province of religion, since it classed among the things which it comprehended certain forms of the incomprehensible.” It caught on and Origin’s 1869 edition used Spencer’s “survival of the fittest”. Spencer’s 1879 Data of Ethics said, “Scientific truths of whatever order, are reached by eliminating perturbing or conflicting factors, and recognizing only fundamental factors.”

1862 Catholicism: Lord Acton / John E.E. Dahlberg (1834-1902) Catholic, so he couldn’t attend Cambridge or Oxford, friend of PM Gladstone. “The most certain test by which we judge whether a country is really free is the amount of security enjoyed by minorities.” In his Catholic journal, The Home and Foreign Review, he said that the Italian 16th century adventurer and bisexual Pier Farnese was Pope Paul 3’s son. The custom had been to call popes’ sons nephews. Vatican hostility killed the Review. (More Acton 1870, 1887)

1862 Ernst Haeckel’s The Natural History of Creation popularized Darwinism. It was much more widely read than Origin.

Leon Foucault, French, calculated the speed of light at 298,000 kilometers per second (kps), just .6% low

1862 Germ Theory Medicine: Pasteur (1856) and others had found that specific microorganisms caused certain diseases. He published the research, the Germ Theory of Disease. It was the most important single advance in the history of medicine. It started modern medicine. Pasteur also improved the technique of inoculation (1796 Jenner) to immunize animals.

1863 Mill (ref. 1859) in Utilitarianism, “pleasure & freedom from pain are the only things desirable as ends.” He argued that cultural, intellectual, & spiritual pleasures are of greater value than mere physical pleasure, because they would be valued more highly by competent judges than physical pleasure. And, “A cultivated mind is one to which the foundations of knowledge have been opened, & which has been taught, in a tolerable degree, to exercise its facilities.” The ethics of utilitarianism influenced a large number of public men & helped shape important reform legislation in the 19th century in England. He also argued against slavery. He opposed statistical probability arguments in science or social science.

As an MP from 1865-68, he urged easing England’s rotten treatment of Ireland. The first MP to advocate women voting, Mill argued for individual rights & tolerance of unpopular ideas & groups like labor unions & farm coops. Wrote On the Subjection of Women in 1869. “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.” And, “Every established fact which is too bad to have any other defense, is given as a injunction of religion.”

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Mill explained that the logical process of Induction worked well due to the uniformity of nature. Also said, “Conservatives are not necessarily stupid, but most stupid people are conservatives.” “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.”

Sir Charles Lyell, England’s foremost geologist, had opposed Lamarck’s theory, & was skeptical of natural selection, published Geological Evidences of the Antiquity of Man, wherein he changed his position & endorsed Darwin’s fundamental ideas. This did much to establish Darwinism among educated people and a blow to anti-Darwinists.

1863 Ernest Renan’s (1823-1892) 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 an ethical humanism without clergy that appealed to many educated persons. He said miracles were only reported in countries by people disposed to believe in them. “No miracle has ever taken place under conditions which science can accept.”

Abraham Lincoln

Slavery: Abraham Lincoln’s Emancipation Proclamation freed slaves but only in the Confederate states, then in revolt. In 1858 had said, “As I would not be a slave, so I would not be a master. This expresses my idea of democracy.”

1863 Huxley’s Evidences as to Man’s Place in Nature was the first clear statement that Man evolved from apelike creatures

“Survival of the fittest”

Alfred Wallace had used the phrase “the best fittest survive” to describe Darwin’s Natural Selection. Spencer in 1864 used the phrase survival of the fittest. Darwin came to prefer this to his own phrase Natural Selection and began to use it. Spencer said survival of the fittest was the inevitable innate law of all things and a beneficial thing.

1864 Anglican heresy charges were brought against 2 of the 7 authors of 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.

A fire storm of protest arose. 11,000 Anglican clergymen signed the Oxford Declaration which declared, “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). In other words, the Bible was Christianity and Christianity was the Bible.

Can the Bible err?

The Bible does have unscientific claims, i.e., the Earth was created in 6 days and it was created in an instant. Woman was made from Adam’s rib. Some men lived hundreds of years. The Red Sea parted. The Sun revolves around the Earth. 5 fish fed 5,000 people. God created every species separately. Jesus walked on water. Moses, Elijah, Tabitha, and Lazarus all died and came back to life. Devils crawl out of people saying Jesus is the son of God Luke 4:41. Devils cause epilepsy Luke 9:39-42.. Prayer heals. Mutes are possessed by devils. Jesus turned water into wine. Sick were healed by touching Peter’s shadow or Paul’s handkerchief. Faith felled Jericho’s walls. An ass argued with his master. Jesus has eyes of fire, feet of brass, and a sword sticking out of his mouth. 144,000 celibate Jews will go to Heaven; all others to Hell. Believers in Jesus aren’t affected by poison. An angel locked up Satan for 1000 years. John saw a monster with 7 heads and 10 horns. Jesus killed a group of pigs by sending devils to make them insane. Matt 8:34 Wine and a wafer become blood and flesh. Jesus cured a blind man with his spit. Jesus killed a fig tree by cursing at it Matt 11:13-14. God drowned all humans and land animals except Noah’s family and two of every animal species.

The scientific community accepted Darwinism. The furore died down. The seven continued their distinguished careers.

1864 Pope Pius 9’s Syllabus of Errors condemned democracy and “that pernicious and insane opinion that liberty of conscience and of worship is the right of every man.” Parents must send their children to Catholic schools. The “errors” Pius 9 cited were 80 ideas favoring reason and freedom of speech & thought. The Syllabus embarrassed most educated Catholics. Even a Spanish journal regretted “the obstinacy and blindness of the [pope] in condemning modern civilization.” In 1854, Pius 9 had declared that Mary was conceived immaculately & born without Original Sin.

1864 Dogma vs. reason: Benjamin Disraeli, soon to be 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.” Not only theologians but some scientists also opposed Darwin, principally as he had not explained the mechanism of species change.

1865 Slavery: The industrial North (despite massive profiteering, Vanderbilt, J P Morgan), won the Civil War. Congress freed all slaves. (England had ended the slave trade in 1808 & legal slavery in the Carribean in 1833. France in 1838.) The legal abolition of slavery in most, not all, countries was the 19th century’s greatest social achievement. But segregation & discrimination (often government enforced) continued. Many persons still consider Blacks inferior.

1865 Ethics: Count Leo Tolstoy (1828-1910), Russian. War and Peace, “When actions are all contrary to all that humanity calls right or even just, the historians [call the perpetrator] ‘great’. Greatness exceeds all the standards of right and wrong. There is no atrocity for which a “great” man can be blamed...Science is meaningless because it gives no answer to our question; the only question important to us is, “What shall we do, and how shall we live?” Tolstoy scornfully refuted the “great man” theory of history. Said, History is a blind force which ignores the designs of man.

1865 Dogma vs. reason: Anglican Bishop Colenso said the Pentateuch (the first 5 books of the Hebrew Bible) reputedly written by Moses, was self-contradictory, had impossibilities (some passages referred to events centuries after Moses). Hobbes & others had said the same. Colenso was right. Nonetheless, Anglicans excommunicated him.

William E H Lecky (1838-1903) Irish, published History of the Rise and Influence of the Spirit of Rationalism in Europe “Every great change of belief has been preceded by a great change in the intellectual condition of Europe, the success of any opinion depended less upon the force of its arguments than on the predisposition of society to receive it.”

1866 Pius 9, who had put Rome’s Jews in a ghetto, said, “Slavery...is not at all contrary to Divine law.” (St. Paul agreed)

Slavery is OK He preferred a monarchy to fight heresy. 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 Economic theory, Socialism, Capitalism: Karl Marx’s Das Kapital replied to Adam Smith’s Wealth of Nations with a compelling study of the exploitation 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 and the Empire of Cotton agreed. See 2014)

1868 Astronomy: William and Margaret Huggins used Fizeau’s 1848 electromagnetic application of the Doppler effect to examine the spectra of stars to determine the elements that made up stars and how fast stars were receding from Earth. By analyzing stars’ spectra, they were the first to distinguish between what are now known as nebulae (a galaxy mostly made of gasses and dust) and galaxies of solid stars.

1869 Chemistry: Dmitri Mendeleev (1834-1907), Russian, recognized order among the elements, compiled a Periodic Table of Elements, showing families of elements, organizing elements by atomic weight and characteristics. His vertical columns contain elements with similar characteristics. The horizontal rows list elements by atomic weight. (Atomic weight is protons plus neutrons plus tiny electrons and even tinier particles.)

Mendeleev wasn’t aware of electrons (discovered 1897) or neutrons (discovered 1932). He even predicted the properties of elements not yet discovered which filled in gaps in his periodic table. John Newlands c1860 and Alexander Beguyer de Chancourtois had first developed the concept of repeated patterns of elements by atomic weight. In 1914, the periodic table was more correctly arranged by atomic number, i.e., number of protons only.

1869 Biology, eugenics: Francis Galton, a cousin of Darwin, founded the field of behavioral genetics, the heretability of behavior. Inter alia, he proposed to create a race of superior men on Darwinian principles, using selective mating.

The railroad across America (largest industrial project ever) and the Suez Canal completed. The world got smaller.

1869 Thomas Huxley (ref. 1855 and 1860) coined the term “agnostic” to describe himself. Said, “It is wrong for a man to say that he is certain of the objective truth of any proposition unless he can produce evidence which logically justifies that certainty...That is all that is essential to agnosticism.” Agnosticism is not an alternative to atheism or theism as it is concerned not with beliefs, but the possibility of beliefs. Atheistic agnostics say that the existence of a god(s) is unknowable. Theistic agnostics say God exists but his nature is unknowable (Ockham and Aquinas).

“Science is simply common sense at its best; that is rigidly accurate in its observation and merciless to fallacy in logic.” (1880). “It is not who is right, but what is right, that is of importance.” 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. 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. Only a scientific people can survive in a scientific future.
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. My business is to teach my aspirations to conform themselves to fact, not to try and make facts 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 loblolly boys counted for as much as the officers 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. 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. Huxley considered Blacks an inferior race.

**Philosophy: Mark Twain**, pen name of Samuel Clemens (1835-1910) America’s most popular & influential author, prospector, reporter, printer, lecturer, river pilot: “Faith is believing what you know ain’t so... The Bible is a mass of fables and traditions, mere mythology.....Man is a marvelous curiosity...he thinks he is the Creator’s pet....he even believes the Creator loves him.” “The Bible is full of interest. It has noble poetry in it; & some clever fables; & some blood-drenched history; & some good morals; & a wealth of obscenity; & upwards of 1,000 lies. “Let me make the superstitions of a nation, & I care not who makes the laws or its songs.” (The power of myth). Twain said if God created Man, it was with a propensity to sin and it was then ludicrous to punish Man for sinning. He also ridiculed Christian Science. And, “A person who doesn’t read has no advantage over a person who cannot.” (attributed)

**Dogma:** Pope Pius 9 convened the 1st Vatican Council and packed it with conservative Italian and Spanish bishops. Specifically, 700,000 Catholics in Roman states had 62 bishops/votes, whereas 1,700,000 Poles from more liberal Breslau had one bishop/vote, a 150 to 1 disparity. Pius 9 caused the Council to vote to decree that the pope is infallible in matters of faith and morals. Lord Acton, the Austrian prime minister, the Prussian ambassador, the French government, and several cardinals tried to prevent the infallibility decree being adopted.

Pius 9 hated democracy, loved monarchies, denounced freedom of conscience. (ref. 1864 Syllabus). The infallibility decree was widely disdained (but reaffirmed in 1963). Critics protested that the papacy was run for the benefit of a few rich Italian families. Italians were c16% of Catholics but were 73% of its cardinals. The Curia was more disproportionate. The Council reaffirmed that God wrote the Bible and that faith overruled reason.

**Victor Emmanuel**, king of Sardinia, conquered Rome and the Papal States (so he was excommunicated), freed Rome’s Jews from Pius 9’s ghetto, unified Italy, but allowed Pius 9 the use of, but not sovereignty over, Vatican City.

**Darwin** published *The Descent of Man* to make explicit that Man’s ancestors were ape-like creatures. “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.” “Man is descended from a hairy tailed quadruped, probably arboreal in its habits.” *Descent was largely concerned with Man’s behavior.*

*Ernst Mayer* said, “No Darwinian idea was less acceptable to the Victorian than the derivation of Man from a primitive ancestor.” *Spencer* had used the word “evolution” to describe Darwin’s phrase, “descent with modification.” Darwin first used the word “evolution” in *Descent.*

Darwin wrote that those primitive ancestors who were the wisest, used weapons and traps best, & those who could best could defend themselves, had the most children. Races evolved due to sexual selection, not Natural Selection. 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 Darwin died in 1882, he was buried next to Newton in Westminster Abbey; Lyell was buried nearby. Alfred Wallace became a great champion of Darwinism and lectured on it in the US.

**Sociology:** Without Darwin’s advocacy, what was called Social Darwinism came to justify inequalities of wealth among men, i.e., the fittest (most successful) businessman or soldier deserved their riches. Darwinism was interpreted as validating Homo sapiens’s dominance over nature. Darwin understood the eugenic biological implications of Natural Selection, “With savages, the weak in body or mind are soon eliminated. We civilized men [try to keep all persons alive]. Vaccination has preserved thousands who from a weak constitution [would have died of smallpox]. Thus the weak...propagate their kind...this must be highly injurious to the race of men.”

**Dogma vs. reason:** Tennessee Supreme Court: Non-believers can’t be “heard or believed in a court of justice in a country designated as Christian.” Six U.S. states have laws prohibiting non-believers from holding public office.

**Otto von Bismark** (1815-98), Prussian statesman, united 200+ German independent states into the German empire.

**Political theory:** *Frederich Engels*, co-author of the *Communist Manifesto*, “The state is no more than a machine for the oppression of one class by another; this is true of a democracy as well as a monarchy.

**Theology:** John Henry Newman, an Episcopalian, then a Catholic theologian, “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." Also, "It would be a gain to [England] were it vastly more superstitious, more bigoted...more fierce in its religion."

**1872** Myths: George Smith (1840-1876) Brit., self-educated Assyriologist, translated tablets from Assurbanipal’s library (then in the British Museum), saw they were Gilgamesh & the Righteous Sufferer epics, saw that creation accounts in Genesis & details of the flood story were adoptions of earlier Mid-East myths, mainly Chaldean, from c2000 BC.

**1872** Reason vs. dogma: W W Reade, Scot, philosopher, "Christianity 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."

Johannes van der Walls, Dutch, said Guy-Lussac’s PVT ratio for gasses was only accurate for ideal gasses.

**1873** Leslie Stephen, former Anglican priest, published Essays on Freethinking & Plain Speaking. He sought real spiritual fulfillment that could not come from religion as religion was impossible to believe. He popularized the word “agnostic.”

**1874** Design Argument

In Theism, John Stuart Mill (ref.1859) argued 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 the limitation of power. Who would have recourse to means if to attain his ends his mere word was sufficient? ... Wisdom & contrivance are shown in overcoming difficulties, & 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...Judging by common sense is merely another name for judging by first appearance. Men who place implicit faith in their own common sense are without exception the most wrong-headed.”

**1875** Physics: J. Williard Gibbs, professor at Yale, wrote a series of papers, On the Equilibrium of Heterogeneous Substances, 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 present and influential at the atomic level of chemical reactions (as Henri Hess in 1840 had suggested.). As Gibbs was very shy, his findings did not become well known for decades.

**1875** The Rights of Women: Susan B. Anthony (1820-1906) American social reformer, president of American Suffrage Assn, “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.” Believing women are inferior, as in Islam, is a powerful attraction to men for any religion. It tells even the lowest lowlife male that he is better than half of humankind.

Raymond Aron, French philosopher, political scientist, “Racism is the snobbery of the poor.” That is, the lower class wants someone they can look down upon. The fear that women will prove equal to men has resulted in religions keeping women subservient, unschooled, without rights, isolated, the property of men. The subjugation of women, enshrined in Hinduism, Buddhism, the Bible, Islam, and many philosophies, has also slowed the advance of knowledge, it has halved the brain pool, as has all discrimination based on race, ethnicity, caste, color, religion, or class. Socrates had said, “Woman, once made equal to man, becomes his superior.”

**1875** Dogma vs. reason: John W. Draper (1811-1882), professor at NYU, first president of the American Chemical Society, said there was a Supreme Power, but not a Supreme Being. In his The History of the Conflict Between Religion and Science, “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...[Science] presents herself unstrained 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. The book had 50 printings. The Spanish version was put on the Index of Prohibited Writings.

He also discovered the spectrum of an ignited solid is continuous, a great help in studying galaxies and nebulae.

**1875** Twisting the words of the Bible.

Reason vs. dogma: The Anglican Dean of Westminster, Dr. Arthur Stanley, 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 of attempted reconciliation with the letter of Scripture...[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." [Such efforts continue to occupy theologians.]

**1876** Dogma: James Cardinal Gibbons, of 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.”
The Golden Age of Freethought was a socio-political secular movement that developed in the US c1870, like the prior secularization of Western Europe’s intelligentsia. There was 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. 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, Ky. spread its messages. The Age of Freethought’s best known orator and writer was Robert Green Ingersoll, colonel in the Civil War, attorney general of Illinois, and prominent Republican.

Robert Ingersoll quotes

“Few rich men own their own property. The property owns them.
Reason, observation, and experience, the Holy Trinity of Science, have taught us that happiness is the only good. Any God who would damn one of his children for the expression of his honest thought wouldn’t make a decent thief.
I am the inferior of any man whose rights I trample underfoot.     Philosophy has not the egotism of faith.
There can be but little liberty on earth while men worship a tyrant in heaven.
There are in nature neither rewards nor punishments – there are only consequences.
I do not believe Christians are as bad as their creeds. It is incredible that only idiots are absolutely sure of salvation. Infinite punishment is infinite cruelty, endless injustice, immortal meanness.
Martyrdom, as a rule, establishes the sincerity of the martyr, not the correctness of his thought. (Like Hume).
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.     Nature never prompted a loving mother to throw her child into the Ganges.
Give any orthodox the power, and today they would punish heresy with a whip, and chain, and fire.
The man who does not do his own thinking is a slave, and is a traitor to himself and to his fellow-men.
Who can overestimate the progress of the world if all the money wasted in superstition were used to enlighten mankind?
Whoever has an opinion of his own, and honestly expresses it, will be guilty of heresy.”
On state blasphemy laws: “An infinite God ought to be able to defend himself, without the help of state legislatures.”
On the Book of Job: “The children of Job were murdered [by God] to settle a wager between God and the Devil.”

1876 Biology: Joel Allen (1838-1921), American zoologist. Within a species, in colder climes, those with smaller appendages like tails, ears, and limbs, were more likely to survive and reproduce, as a smaller surface area reduces heat loss.

1877 Dogma vs. reason: an eminent French physician, Constantin James in his book, Darwinism or the Man-Ape 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.

Pius 9 said, “Darwinism is repugnant to history, to exact science, to observed facts, and even to reason itself.”

1877 Physics: Clausius’s 2nd law of thermodynamics 1848 said some energy (called entropy) is lost in converting heat to work. Ludwig Boltzmann (1844-1906) Austrian, on the kinetic theory of gasses, established the relationship between entropy & his statistical analysis of molecular motion. He devised a formula to measure entropy. Like Gibbs, he connected the properties behavior of atoms’ molecules with the large scale properties & behavior of the substances of which they were a part. Boltzmann was important in getting atoms & molecules accepted as real. Boltzmann & Josef Stefan said that energy output of an object was directly related to its temperature.

1879 Political Theory: Henry George (1839-1897) Progress and Poverty, “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 between the House of Hases 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 it may be. It...instinctively fears change...How can a man be said to have a country when he has no right to a square inch of it?”
He noted the similarities between humans & animals.

1879 Newtonian physics limited: Physicist Albert Michelson (1852-1931) and chemist E W Morley said light went 186,320 miles/sec (only .000215 high), that the absolute motion of the Earth through space isn’t measurable. They showed the speed of light [and thus 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. In 1880, they also refuted the universal belief (including held by Descartes & Newton) in ether, a substance thought to exist in space which conducted light. They proved that ether did not exist. Michelson won the physics Nobel prize in 1907.

1880 Pope Leo 13 decreed that Aquinas (pre-Enlightenment, pre-Renaissance, pre-Darwin, pre-Locke, pre-Hume, pre-Reformation) to be the definitive guide of Catholic doctrine. Only Aquinas-schooled professors could be hired. Said, “The liberty of thinking and publishing whatsoever each one likes...is the fountainhead and origin of many evils.”

1880 Catholicism: Fyodor Dostoyevsky’s (1821-1881) The Grand Inquisitor, a cardinal & atheist, explained to Jesus, who had returned to Earth and come to Seville, where the Grand Inquisitor had arrested him, that the Church no longer needed him as the vast majority of people can not cope with the free will Jesus gave them. The Grand Inquisitor had Jesus jailed for threatening to subvert the Church. He asked Jesus, “Did you 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 Thy will that we rule over them. We will deceive them once more and lie to them once again—for nevermore will we allow Thee to come amongst us. In this deception we will suffer, for we must lie eternally and never cease to lie.”

(Schopenhauer, Aldous Huxley, Orwell, & T. S. Eliot, “Humankind cannot bear much reality.” all wrote the same.)

1880 Parliament prohibited Charles Bradlaugh, an atheist, from taking his oath of office as an MP by “affirming” rather than “swearing on the Bible”. Bradlaugh said that he could not know what anyone meant by the word “God.”

1881 Karl Pearson (1857-1936) Brit, polymath, Royal Society, barrister, established the discipline of mathematical statistics, published The New Wether, “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)

1881 August Bebel, in the Reichstag, “Christianity is the enemy of liberty and of civilization. It has kept mankind in chains.”

1881 Political Theory, Anarchism: Mikhail Bakunin (1814-1876), Russian revolutionary and theorist, born a noble, influenced by Marx and Hegel, imprisoned for 12 years, influential with all European and Russian revolutionaries. His beliefs were based on the concepts, 1. Liberty, 2. Socialism, 3. Federalism, 4. Anti-theism, 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. He said, “Revolution need not be violent.”

Mikhail Bakunin quotes

Philosophy: In his God and the State, “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... The idea of God implies the abdication of human reason and justice; it is the most decisive negation of human liberty and necessarily ends in the enslavement of mankind.” Until now, all human history has been only a perpetual and 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, public welfare.

“Religion has always sanctified violence and transformed it into right... Religion is collective insanity,”

1881 Henrik Ibsen (1828-1906) Norwegian, “The majority never have right in its side. Never. [We] must agree that the fools are in a terrible overwhelming majority, all the wide world over.” Lies you tell to yourself about yourself are “saving lies.”

1882 Cells divide, mitosis

Biology: Walther Flemming (1843-1905) German, wrote that animal 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 the atom is to physics, the cell is to biology. Atoms are the building blocks of all matter. Cells are the building blocks of all life. Cells are made up of millions of atoms. Atomic theory was not yet accepted by most physicists.

1882 Political theory: 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 criticized Muslims as incapable of doing philosophy and science. He believed in a hierarchy of races.

1882 A liberal Muslim

Sayyid Jamal ad-Din al-Afghani (1838-1897) an eminent Muslim and supporter of the Tanzimat, considered to be a founder of Islamic modernism, agreed that all religions are intolerant and suppress the “free investigation” of science and philosophy. He was the first to advocate that the Enlightenment had freed Europeans from Christianity and had greatly advanced science, but that Islam would in time also advance.

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 because science does not completely satisfy humanity...”

He said Europe’s success was due to science and its laws. “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?” He said that the religious person was like an ox yoked to a dogma that stifled science. Turkey became the most technologically advanced Muslim state, but still lagged far behind European countries.

1882 “God is dead

Philosophy: Friedrich Nietzsche (1844-1900), German, brilliant, professor of classics at Basel at 24, in Also Sprach Zarathustra / Thus Said Zarathustra wrote, “God (i.e. divine explanations for anything) is dead.” (Max Stirner had said it in 1845). 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 a ein Übermensch (literally an overman). 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**, 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.

1882+

Philosophy: Nietzsche said, “Everything in the Bible is cowardice & self-deception.” 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 favored religions as they assisted his favored supermen (Übermensch) to control the ignorant masses.

[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 and made abstract—that they defend with reasons they have sought after the fact....To grasp the limits of reason – only this is truly philosophy....

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 and the important insights...Happiness is a pig’s philosophy.

**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.”  Also, “Reason is only a tool.”  1886  He ridiculed the “social contract” theory of the state, said, “He who commands, he who is master by “nature,” he who comes on the scene forceful in deed and gesture – what does that have to do with contracts?”

**Beyond Good and Evil**

Philosophy: In Beyond Good and Evil 1886, Nietzsche argued that 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 turn conventional values upside down in order to live creatively. He said that the established values of society were invented by the weak to enable them to triumph over the strong. (In contrast, Machiavelli (and several others) said that the rules of society were to enable the strong to keep the weak in submission.)

“Anti-Semitism is the final consequence of Judaism.”  1888

“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

“What is it; is Man only a blunder of God, or is God a blunder of Man?”  1889

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...

**Nietzsche**, a professor for just ten years, sickly, retired due to ill health, went insane at 44, died at 56.

1884

**Pasteur** (ref. 1856,1860, 1862) developed a successful vaccine against rabies. “Chance favors the prepared mind.”

1885

**Dogma**: Pope Leo 13, “Equal toleration of all religions...is the same thing as atheism...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... Catholicism cannot be reconciled with naturalism or rationalism. (In 1879, he had said, “God is not only true, but Truth.”) He also said, “To despise legitimate authority, no matter in whom it is invested;...is rebellion against God’s will.”

1886

**Physics**: Ernst Mach (1833-1916), Austrian, Sensations are not simply raw experiences, but the interaction of experience with a pre-formed cognitive structure (like Kant). 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 show how these are connected.

In physics, Mach posited that matter is distributed in space in defined inertial frames. He rejected **Newton’s** absolute frame of reference for space-time. Accelerated motion is relative to the average mass distribution in the universe. These frames are those relative to which the distant matter of the universe is on average, not accelerating. He suggested that the distant matter actually determines the inertial frames related to gravity.

The laws of Newtonian mechanics are meaningful only if events are referenced to certain special frames of reference.
For example, a planet has one velocity relative to the Sun but another velocity relative to another planet or another sun or relative to the center of a rotating galaxy it is in, or relative to the singularity. These frames are those relative to which the distant matter of the universe is on average, not accelerating. The distant matter actually determines the inertial frames related to gravity. Einstein credited Mach in his writings on relativity.

Islam: al-Afghani (ref.1882) published The Refutation of the Materialists which severely criticized naturalists / materialists for denying that there is a higher intelligence operating in the universe. He said that Islam is the only way to salvation for humanity. Refutation contained a scientific and philosophical criticism of Darwin and his evolutionary theory. He rejected the idea of chance in nature and accused the materialists of attributing “perception and intelligence” to atoms (i.e., matter) in and of themselves. He rejected totally the idea of universe as a self-regulating structure without a higher intelligence operating on it. This is the most philosophical section of the treatise.

America welcomed immigrants, “Give me your tired, your poor, your huddled masses yearning to breathe free... Send these, the tempest tossed to me.” Emma Lazarus’s poem on the Statue of Liberty. (Unveiled 1886). Communists in London called a strike for an eight hour day against Christian employers who worked children seven days a week.

Anthropology: Franz Boas (1858-1942) German American, the “father of modern anthropology.” His 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 criticized the then current belief in a teleological (purposeful) process of evolution where change occurs progressively regardless of natural selection.

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.

Catholicism: Lord Acton (ref.1862, 1870) wrote of the pope’s 1870 claim of infallibility, “Power tends to corrupt, and absolute power corrupts absolutely. Also said, Great men are almost always bad men....There is no worse heresy than that the office sanctifies the holder of it.”

“To break with the Church because the Papacy had shown itself wicked in 1870 was ridiculous. 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?”

“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.”

Eric Hoffer (1898-1983) American philosopher and stevedore: “Power corrupts the few [as only a few have power], while weakness corrupts the many.... Absolute faith corrupts as absolutely as absolute power.”

Pragmatism: Charles Peirce (1839-1914), polymath, philosopher, and mathematician, founded pragmatism, America’s first indigenous school of thought, where the meaning of an idea lay solely with its consequences. He even said, “If the hypothesis of God works satisfactorily in the widest sense of the word, it is true.” Peirce also founded semiotics, a branch of structuralism whose basic idea is that all sorts of behavior are communicative, that is, they make a statement (nose ring). Semiotics studies the systems, akin to language, in which such statements / signs assume meanings.

William James (1842-1910), a leading philosopher, continued Pierce’s thinking in pragmatism.

“We say Newton’s law of gravity is true because it has proven useful in predicting the behavior of objects.
All our scientific and philosophical ideals are altars to unknown gods.
An act has no ethical quality whatever unless it be chosen out of several all equally possible.”

Be not afraid of life. Believe that life is worth living, and your belief will help create that fact.
It is wrong always, everywhere, to believe anything upon insufficient evidence. The deepest principle in human nature is the craving to be appreciated.
Religion is a monumental chapter in the history of human egotism.
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.
There is only one thing a philosopher can be relied on to do, and that is to contradict other philosophers.
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. The God whom science recognizes must be a God of universal laws exclusively, a God who does a wholesale, not a retail business. He cannot accommodate his processes to the convenience of individuals.”

Mormons: A divine revelation told the Latter Day Saints president that polygamy was not OK, so it was ditched. Utah could then become a state. LDS is the largest Mormon sect. Mormons baptize dead people of other religions.
Christian and the Bible are intertwined in the 19th century. For example, in 1890s, Marie Curie, who won the Nobel Prize in Physics, stated that "The history of science is never written without the Bible, which has God as its author, salvation for its end, and the essence of which lies in the rigorous application of a single principle...every man should be able to give a reason for the faith that is within him, it is the great principle of Descartes, it is the fundamental axiom of modern science.

In 1896, Arthur Balfour's The Foundations of Belief argued that God is not a source of love for faith, so faith is needed to believe. Andrew Dickson White, an American clergyman, stated in 1893 that "God for their author," (2 Tim. 3:16) and were thus incapable of error. (The Bible never mentions "pope, monks, nuns, purgatory.)

William Thomson, who became Lord Kelvin of Largs in 1866 and made Lord Kelvin of Largs, was the first scientist to enter the House of Lords. He was knighted in 1866 and made Lord Kelvin of Largs. First scientist to enter the House of Lords.

Dogma: Pope Leo 13's (ref. 1880) The Grammar of Science: "The laws of nature are relative to the perceived ability of the observer... An observer who travels at the exact velocity of light would see an eternal now, or an absence of motion." He also discussed antimatter, the 4th dimension, wrinkles in time. A believer in the equality of the sexes, an eugenicist, a social Darwinist, freethinker, and as a socialist, refused the OBE in 1920 and a knighthood in 1935.

How the Bible is true

White termed the Christian holy scriptures "true," not for their factual accuracy but because their mortal authors strove for higher moral beliefs and aspirations. He said the Chaldean flood story, where the flood was a capricious act of the god Bel, to the Genesis version, where the flood story was based on morality showed the upward growth of Man. White said, "The list of those whom the Christian churches have denounced as "infidel and "atheist" includes almost all the great men of science..., inventors, and philanthropists; persons of noble Christian character like Newton, Pascal, Locke, Milton, and Descartes." (See p. 179 for authors put on the Index) H. L. Mencken (1925) highly praised Warfare. By 1896, most universities in the US and Europe were run by laymen, not clergy.

Physics: Antoine Becquerel, Pierre and Marie Curie (1867-1934), Polish, observed a fourth kind of force, the weak force, beta decay, that Marie Curie named radioactivity. (The three then known forces were gravity, electromagnetism, and the nuclear, or "strong" force). It was at first thought to violate the law of conservation of energy. Radioactivity is tiny portions of the mass of an element being converted into energy, a fact not realized until decades later. They isolated radium and polonium. Curie, "Nothing in life is to be feared. It is only to be understood." Pierre & Marie won the Nobel
1. Each physical characteristic of a living organism is the product of a specific hereditary factor, now called a gene.

2. These “genes” exist in living things in pairs. The mother’s pair may have a gene for green eyes and a gene for hazel eyes, and the father’s pair, 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. The color of a child’s eyes are never a mixture of genes.

5. Some traits (characteristics) 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.

Biology: Mendel had published his findings in 1866 in the obscure Journal of the Brunn (now Brno) Natural History Society. Clergy criticized his findings as Darwinian. The Church disfavored his scholarship, so on his death, the monks in his monastery burned all his papers. Though his work received favorable notice in the Encyclopedia Britannica, it was
1900

Biology: Mechanism of evolution discovered: Hugo de Vries (1848-1935), Dutch, wrote *Intracellular Pangenesis* that caused Mendel's 1866 work establishing the laws of heredity to become widely known. De Vries posited the concept of genes &, citing Mendel, developed a mutation theory of evolution. He posited that different characteristics have different hereditary carriers of specific traits are units now called genes. Thus Mendel's theory was confirmed and he became recognized as the father of heredity. Mendel & De Vries thus explained how natural selection worked.

De Vries proposed that random mutations of genes suddenly appearing, caused well defined, inheritable variations (confirming Mendel's work), (as opposed to the gradual changes stressed by Darwin), & were the forces in the origin & evolution of species. Mutations that change organisms & of themselves are random & have no purpose. Gene mutations occur naturally 1. When a cell divides, it makes a copy of its DNA, and the copy might not be a perfect copy, or 2. exposure to specific chemicals or radiation can cause the DNA to break down and repair itself imperfectly.

Then, those mutations that help the organism survive (or at least don't hurt) & reproduce. Those that hurt survival simply die out. Giraffes didn't develop long necks/long legs in order to eat high leaves. This would imply a *purpose* to a random genetic mutation. A longer neck and legs was a random genetic accident born to one shorter necked and shorter legged creature which then survived in part as it could eat higher leaves and which then reproduced longer necked & legged offspring. This did in Lamarck. (Lamarckism is different from the sciences of genetics and eugenics, wherein selective breeding / artificial selection is widely taught as Animal Husbandry, to improve a breed).

As *genetic mutations are random, Natural Selection is blind and wasteful*, creating new species that die and do not reproduce even once as they are not fit to survive. For example, a fawn born without legs will never pass along the mutated gene that caused such condition. Thus, new organisms happen first by random gene mutations, and then survive or die out by *Natural Selection*. c99% of all species that ever lived are extinct; as many new species consisted of just one creature which was born but not fit to survive, so did not.

The inefficiency of *Natural Selection* and the suboptimal design of biological organisms destroys the notion that a particularly intelligent entity designed Man. *Darwinism* gave a new view of history. As *Darwinism* became widely recognized as accurate, some Christian theologians began to say that *Natural Selection* actually supported the Bible.

1900

Newton's physics is limited

Physics: Classical Newtonian mechanics did not describe sub-molecular phenomena, such as the repartition of energy in the molecules of a gas or the energy distribution of radiation emitted by hot bodies. To answer this, Max Planck (1858-1947), a German theoretical physicist, had experimented with the radiation of light in various frequencies. He provided an explanation to the problem of “black body” radiation. Hot objects radiate heat. Black objects absorb all frequencies of electromagnetic radiation, and thus should radiate all frequencies equally, but did not. Planck deduced that his experiments only worked if light emananated in discrete particles, although physicists generally had discarded *Newton's particle/corpuscular theory of light in favor of Huygens's wave theory*.

Planck, Quantum theory

Physics: Planck thus formulated a revolutionary new *quantum theory*, that all energy, including light, consists of whole units of energy (quanta, whose size is proportional to the frequency of the radiation). An object can have one quantum or a million quanta, but not 1.5 quanta, i.e., energy moves not in waves but in particles. This theory was published in the German journal, *Annalen der Physik* (Planck was the editor). This was a return to *Newton's particle/corpuscular theory of light*. (Light particles are pure energy with infinitesimal mass which allows for interaction at great distances.) *Quantum theory explains a wide variety of phenomena of atomic physics, chemistry, and astrophysics.*

Planck's theory became well noticed only when Einstein in 1905 introduced the light *particle* and used it to explain the photoelectric effect (light shining on metal knock outs electrons out of the metal, creating an electric current), to reconcile theory and experiment for heat, and to account for the propagation of light without relying on an "ether."

*Physics, optics:* (Huygens in 1690 had showed that light traveled as a wave (as did Thomas Young & Clerk-Maxwell in 1867). Diffraction and interference were explained only if light acted as a wave.) Planck showed that light *acts* as a wave in some experiments and as a particle in other experiments, but it is neither. It is something more sophisticated.

1900

Gravity: Hendrik Lorentz (1853-1928) Dutch physicist, posited that gravity could be attributed to actions that go at light speed. Lorentz 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.

20th century

In the *20th Century*, science exploded. More scientists are working now than all previous centuries combined.

Botany: Luther Burbank (1849-1926), pioneered plant breeding / eugenics. He created many productive varieties of fruits and vegetables. Wrote, “The Bible is an incomplete history and the folklore of an ancient race, but no more.”

Political theory: H.G.Wells (1866-1946), Brit., historian, “The Social Contract is nothing more or less than a vast
1900-39

**Sigmund Freud**

How we think: Sigmund Freud (1856-1939), Vienna, popularized the then relatively common idea of the unconscious. He invented psychoanalysis to sort out the unconscious mind. He was more controversial than Darwin. 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 craved war, to kill, cruelly and brutally. Freud divided the self into three co-existing parts. The ego perceives, learns, and acts consciously. The super-ego is the largely unconscious moral conscience created during childhood. The id is the repository of unconscious; it desires pleasure without limit and without regard for reality, like the Greek eros. He also said “Religion is comparable to a childhood neurosis.” and “Religion is an illusion and it derives its strength from the fact that it falls in with our instinctual desires.”

He said Man had received three staggering blows to his arrogant & narcissistic self-image. Copernicus took Man out of the center of the world. Darwin showed Man his close kinship to animals. He, Freud, had shown the power of Man’s subconscious. Stephen Jay Gould (1972, 1997) suggests that Freud omitted the advances in geology & paleontology that displaced the Biblical story that was comforting to humans, that God made the world for man. In this regard, Freud did say, “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. Religion is an infantile delusion...It would be nice if there were a God who created the world & was loving...[but] in the long run, nothing can withstand reason & experience...When a man is freed of religion, he has a better chance to live a normal & wholesome life.” (Another staggering blow to the dominant Caucasian psyche came in 1908 when Negro Jack Johnson beat Tommy Burns to become the world heavyweight champion. The previous champion had resigned rather than face Johnson)

**1901**

Chemistry: Karl Landsteiner (1868-1943), Austrian, discovered blood was in different groups, and blood from one group killed red cells of another group.

**1902**

Why torture for God? H G Wells said re the inquisitions, “It was just because many of the Church leaders probably doubted secretly of the entire soundness of their vast & 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.”

**1903**

Ernest Rutherford (ref. 1899), in 1899 had seen two kinds of radiation coming from thorium and uranium. He had said that radioactivity was the spontaneous disintegration of atoms. In 1903, Rutherford saw a more powerful radiation from radium. He then realized that chemical reactions involve only electrons that moved around the nucleus of an atom, whereas nuclear transformations are dependent solely upon changes within the nucleus of an atom.

**1903**

Aeronautics: After years of study and experiment, Orville Wright piloted a motorized glider at Kitty Hawk, N.C. for 12 seconds and 120 feet (half the length of a 747). He and his brother, Wilbur, bicycle makers, built it. Their crucial insight, they perfected the guidance and control systems, ailerons and rudder, which other experimenters had ignored.

**1903**

Hirobumi Ito, 4-time PM of Japan, Religion is “quite unnecessary for a nation’s life; science is far above superstition; and what is religion, Buddhism or Christianity, but superstition, and therefore a source of weakness to a nation.”

**1904**

Sociology: Max Weber said that Protestantism’s connection of piety and work furthered capitalism. He named three kinds of authority, charismatic (family and religions), traditional (kings, feudalism), and legal (the modern state).

“Philosophy is useful as only it can validate the concepts, such as the person, through which we understand and act.”

**1905**

Epistemology: James Welton, “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 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 does, or can, conceive of them reversed, or violate them, because no one ever accepts a contradiction which presents itself to his mind as such.

**1905**

George Santanyana (1863-1952), Spanish American philosopher, “Christianity persecuted, tortured and burned. Like a hound, it tracked the very scent of heresy. It kindled wars, and nursed furious hatreds and ambitions. It sanctifies, quite like Muhammadism, extermination and tyranny. All this would have been impossible if, like Buddhism, it had 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...Words are weapons”

**1905**

Physics: Albert Einstein (1879-1955), born in Ulm, published 4 extraordinary papers in the Annalen der Physik, while working as a patent examiner in Berne, going further to solving the riddle of the world than anyone else. He once explained himself, “I rarely think in words at all. A thought comes, and I may try to express it in writing.” And, “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.”
E = mc²
E = energy
C = speed of light
M = mass

1905

**Photoelectric effect of light**

Paper 1. (published in June) The photoelectric effect of light (light shining on a solid knocks electrons out of the solid (creating an electric current) with a velocity independent of the light’s intensity). This could be understood if light interacts with matter as particles (quanta) of energy (Planck’s 1900 idea), contrary to Huygen’s wave theory. If light consisted of quanta, with energies proportional to wavelength, then the atoms in a metal surface would only be affected by intact quanta with enough energy, Planck was editor of Annalen and encouraged Einstein. Long wave-length (low frequency) 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 quantum grew larger, and a point would be reached where the energy was just enough to dislodge an electron. As light is energy given off by matter, its propagation must ultimately trace to the release of energy at the atomic level,

1905

**Einstein’s** assertion that light was particles was largely dismissed by physicists, who had accepted Huygen’s wave theory. His analysis explained the photoelectric effect. It used Planck’s 1900 quantum theory to explain a phenomenon otherwise unexplainable. This seemed to contradict Huygen’s wave theory of light. This paper got Einstein a Nobel in 1921. Planck showed light acted as waves and as particles and helped establish his quantum theory.

**Brownian motion**

Paper 2. (July) said that 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. He explained how to measure the size of liquid molecules.

**Theory came to be called the Special theory of relativity**

Paper 3. (Sept.), On the Electrodynamics of Moving Bodies was influenced by Pearson’s The Grammar of Science (1892), by Ernst Mach (ref.1886), & by Lorentz’s work on electromagnetism (ref.1899). Einstein proposed a radical theory saying that the independence of an observer’s state of motion on the observed speed of light required fundamental changes to the notion of simultaneity. Einstein took Lorentz’s equations & applied them to all events in space & time. The consequences of this include the space-time frame of a moving body slowing down & contracting (in the direction of motion) relative to the frame of the observer. In relativity, mass & energy are two forms of mass-energy. Einstein said the speed of light /electromagnetic waves was the universe’s only constant.

All electromagnetic waves, including light, go the same speed, under all conditions & for all observers. Assuming this, and that the laws of nature are constant, then time & motion are relative to the observer. It was called special as it dealt only with things moving in an essentially unimpeded state, i.e., no gravity, thus moving at a constant velocity. Nothing can go faster than electromagnetic waves. Contrary to Newton, space & time are flexible forming space-time.

This theory added space-time as the fourth dimension of the universe. Time looks & acts like a spacial dimension. It could be warped by gravitational fields. Einstein used non-Euclidian geometry to deal with space-time. This theory was first called the Lorentz-Einstein theory. He later wrote that Lorentz’s work formed the basis for the general & special theories of relativity. The special theory was a more detailed expose of those concepts in Lorentz’s1895 research.

E = mc²
E = energy
C = speed of light
M = mass

**Einstein’s** work formed the basis for the general & special theories of relativity. Einstein here treated light as a wave. He said 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 miles per second, there’s a huge amount of energy bound up in every bit of matter. Even the uranium bomb, the most energetic thing yet produced, releases less than 1% of the theoretical energy it could release if one really knew how.

According to E = mc², 1 gram of mass = c85.2B BTUs or 900BB ergs of energy. So stars/suns can fuse four hydrogen atoms into one helium atom, expelling energy / photons for billions of years without using up all their matter. (While E = mc² had not been proven experimentally, it has now been verified by experiments at MIT & other labs.).

1906

Physics: Richard Oldham (1858-1936), Brit., discovered that earthquake waves travel through the middle of the Earth slower than through the mantle. Thus he deduced that the core of the Earth is liquid.

1906

Upton Sinclair (1878-1968), most influential muckracker in the U.S. The Jungle exposed the filth in meat packers. Sinclair wrote 100 muckraking books. (See 1918)

1906

Third Law of thermodynamics: (ref 1847) Walther Hermann Nernst. “As a system approaches absolute zero temperature, all processes cease and the entropy of the system approaches a minimum value.” One can’t get to absolute zero as one can’t destroy energy or matter. (See 1913 Planck) The 3 laws of thermodynamics are known as, “You can’t win; you can’t break even; and you can’t get out of the game.”
1907 **Boas** (ref.1887) defined the anthropologist’s job to see why are tribes and nations different & how did they get that way.

Physics: **Bertram Boltwood** (Yale) discovered how to determine the age of a rock, measure its radioactive decay.

1907 **Einstein** considered how Newtonian physics would have to be modified to fit into his relativity idea. Before **Einstein**, physicists believed there were two measures of mass, gravitational mass (the weight of an object) and the inertial mass, (the actual number of atoms in the object, the resistance of an object to change its course). **Einstein** said there was just one kind of mass. He thought up the idea of the complete physical equivalence of a gravitational field and the corresponding acceleration of a reference frame."

This assumption extends the principle of relativity to the case of uniformly accelerated motion of the reference frame."


That is, a rocket ship’s instruments could not tell the difference between its acceleration and the effects of gravity. This is called the **Equivalence Principle** and from this came **Einstein’s General Relativity** ("GR") in 1915.

Due to Planck’s enthusiastic endorsement, **Einstein’s** ideas slowly gained him attention and respect, principally among German-speaking theoretical physicists. He stayed a patent examiner until 1909 when he became a professor.

1907 **Dogma**: Pope **Pius 10**’s syllabus, *Lamentabile Errors of the Modernists*, listed 65 “heretical” beliefs, basically all those beliefs that said that humans influenced Church dogma. One who believes a heresy goes to Hell. He thus rejected **Andrew White**’s attempt to validate the *Bible* as the striving of mortal men to reach for higher moral values. **Pius 10** required all priests to take an oath against modernism & those studying secularism or modernism had to stop. He declared modernism itself a heresy. He prohibited seminarians from reading any newspapers whatsoever.

1907 **Elan Vital**: **Henri Bergson** (1859-1942), French, a popular public intellectual and philosopher, posited that **intuition was more important than intellect**. His 1907 *Creative Evolution* attempted to integrate biological science with a theory of consciousness. It described the concept of an *elan vital / creative impulse*, an non-material force that provides the vital impulse that continuously shapes all life but whose existence cannot be scientifically verified.

*He* explained that *elan vital* was the creative course of evolution, not Darwin’s natural selection. Intuition goes to the heart of reality and enables man to find philosophic truth. **Bergson**’s work is sometimes claimed to be the main challenge to the mechanistic view of nature. **Russell** said **Bergson** could not explain how his intuition could work apart from intellect, that **Bergson’s** “intuition worked best in ants, bees, and **Bergson**.” *Elan vital* became *Elan morte*. In 1914, all his books were put on the Catholic *Index*.

1909 **Political theory**: **Carl Becker**, American historian’s *History of Political Parties in the province of New York, 1760-1776*, formulated the “progressive” interpretation of the American Revolution. He argued that there were in essence two revolutions, one to gain independence and the other to determine who should rule the newly independent nation.

1911 **Plate Tectonics**: **Benjamin Franklin** had said that the crust of the Earth could be like a shell, disturbable by interior forces. **Frank Bursley Taylor**, American geologist, in 1908 proposed that the continents once drifted around and that the crunching together of continents’ plates pushed up mountain ranges. He was ignored. **Alfred Wegener**, U of Marburg, in 1912 named the original mother continent *Pangaea*. Geologists for about 30 years discussed but rejected the idea saying there was no force strong enough to move continents. The heat at Earth’s center from decaying radioactive atoms drives the plates’ moves (The theory was eventually accepted, see 1944).

1911 **New model of the atom**: **Rutherford** (ref.1899) posited a new model of Thomson’s atom, a tiny very dense positively charged nucleus inside a vast empty space surrounded by negatively charged electrons, and that the nucleus is only one billionth of one millionth of the full volume of an atom but contains 99.995% of an atom’s mass, like a pearl in the SuperDome.

**Eddington** (ref.1918, 1933) called Rutherford’s model the greatest change in our idea of matter since the time of **Democritus**. Eddington: “One of man’s oldest riddles. 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 1913)

1911 **Political theory**: **Ricardo Flores Magon** (1874-1922), Mexican anarchist, inspiration of the Mexican Revolution, “The only thing for which authority is needed is to maintain social inequality.”

1912 **Astronomy**: **Red-shift, Blue-shift**: **Vesto Slipher** (1875-1969), Lowell Observatory, Arizona, observed the light from nebulae (visible cloudy blobs of light, not distinct stars, listed by Messier in 1774). He measured their redness and blueness compared to the spectrum of light from the Sun (at a fixed distance from Earth). **Fizeau** in 1848 had confirmed **Doppler’s** theory that light from stars going away from Earth appeared redder as the red end of sunlight’s spectrum had a lower frequency -longer wavelength (less waves per second) than the blue end. **Fizeau** and the astronomers **Huggins** had said that the redness was due to the fact that such nebula were going away from Earth and all the electromagnetic waves (including light) would be spread out and thus appear redder. (See 1915 Slipher)
1912+ Philosophy: Bertrand Russell (1872-1970), a lord, philosopher, agnostic, mathematician. Russell took Einstein literally and concluded that there is no substance; everything in the universe is made of space-time events, and events are neither physical nor mental. Mind and matter are different ways of organizing space-time. Said “The word “cause” is so inextricably bound up with misleading associations as to make its complete exclusion from the philosophical vocabulary desirable.”

He said, “Christians hold that their faith does good, but other faiths do harm...What I wish to maintain is that all faiths do harm. We may 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 2 and 2 are four, or that the Earth is round. We only speak of faith when we wish to substitute emotion for evidence.” “Men fear thought as they fear nothing else on Earth – more than death. Thought is subversive, revolutionary, and merciless to privilege, established institutions, and comfortable habits.”

All faiths do harm

Special pleading vs. philosophy

Russell, “Philosophy, if it cannot answer so many questions as we could wish, 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, and philosophy is what we don't know....The finding of arguments for a conclusion given in advance is not philosophy but special pleading. ...Philosophy, like all other studies, aims primarily at knowledge. The kind of knowledge...that which gives unity and system to the body of sciences, & the kind which results from a critical examination of the grounds of our convictions, prejudices,& beliefs

Design Argument

Theology: Russell criticized 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 an immortal, create mortal humans; why not create immortal humans?” [or maybe make them smarter or healthier or nicer, or give them a friendlier planet?] Russell said that Leibniz’s claim that there was no real evil in the world contradicted Christian dogma. & “It is the preoccupation with possessions, more than anything else, that prevents men from living freely and nobly.” Also, “All the conditions of happiness are realized in the life of the man of science.”

Orbiting Teapot.

People think if it’s got a name, it exists.

Whitehead

Philosophy: Alfred North Whitehead (1861-1947), “I consider the Christian theology to be one of the great disasters of the human race...It would be impossible to imagine anything more un-Christian than 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.” We think in generalities, we live in detail. Whitehead, Russell, and Giuseppe Peano extended algebra from symbols for numbers to symbols for concepts, creating symbolic logic.

Process Theology

A new religious philosophy, Process Theology, was influenced by Whitehead’s metaphysical process philosophy. It is an attempt to retain a concept of a God in light of the overwhelming evidence of the power of science & reason. 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 has the power of persuasion. Reality is not material substances but is serially related events, which are experimental in nature. These events have both a physical & mental nature. All experience is important & contributes to the ongoing & interrelated process of reality. God is incarnate in everyone’s life when one acts in a godlike manner. As it denies Jesus’ divinity, it is not accepted by Christian religions.

1913 Political Theory: American historian Charles Beard’s Economic Interpretation of the Constitution continued Carl Becker’s & Karl Marx’s “progressive” interpretation of history. He said the writers of the Constitution were mainly wealthy elites protecting their property (10 of the first 12 presidents owned slaves, including Washington, Jefferson, Madison, Monroe, & Jackson.) Beard made historians consider the economic interests of historical figures to explain their actions. Marx had said social classes were the driving forces in history; that is, social classes act in their economic interests. But, while the small ruling class does act in its economic interest, i.e., to protect its wealth; the lower classes often do not. The ruling classes, who control the education & the media in every country ally with the clergy to influence
the lower classes to act based on emotive social issues which may not align with their economic interests. (ref. 1532)

1913
Physics: Niels Bohr (1885-1962), Dane, wrote On the Constitutions of Atoms and Molecules. He proposed a modification of Rutherford’s 1911 model of an atom (a tiny positively-charged nucleus and negatively-charged electrons circling somewhere around the nucleus). Bohr said electrons orbit the nucleus of an atom in fixed concentric orbits. Electrons in different orbits have different energy levels. The number of protons in the nucleus determines what element the atom is and is the atomic number of the atom. The number of electrons in the outermost orbit of electrons determines the atom’s chemical behavior, i.e., what elements, if any, it can combine with. He said electrons keep from falling into the nucleus only if they occupy such well defined orbits.

Bohr devised a still-accurate set of rules that explained some of an atom’s chemical characteristics. Einstein’s 1905 paper on the photoelectric effect was fundamental to Bohr’s modification of Rutherford’s 1911 model of the atom.

Bohr said that when an electron absorbs energy (energy is 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, the famous quantum leap. Having fixed energy quantities (quanta) is the quantum theory of the atom. An atom’s structure was now as mathematical as Newton’s universe, but it contained also the principle of the quantum. When the force goes away the electron goes back to its previous orbit, releasing energy in the form of light. (More Bohr, 1923, 1927, 1933)

1914
Planck (1900) “The entropy of each pure element or substance in perfect crystalline form is zero at absolute zero.”

Astronomy: Harlow Shapely, American astronomer, used cepheids (stars whose brightness varies) to derive the overall shape of the Milky Way. He determined our solar system is on the outskirts of the Milky Way. (See 1920)

1914 World War One: By 1914, the developed countries were money economies. In 1914, the Panama Canal opened; a Serbian nationalist killed the heir to the Austro-Hungarian throne. Anger, alliances, miscues; global empires clashed. The US joined neutrality, but in 1917 joined England (with its colonies, Australia, New Zealand, S. Africa, Canada), Russia & France to defeat Germany, Austro-Hungary, and Turkey. 21M killed. Germany seethed. Most American military dead were from the flu. In 1918-1919, Spanish and swine flu killed 40-50 million people worldwide, perhaps more.

1915 Slipher (ref.1912) reported that most nebulae had considerable red-shifts but that the nebulae Andromeda (spotted first as a cloud / nebula, by al-Sufi in 964) had a blue-shift spectrograph, thus is approaching the Earth.

1915 Einstein: Einstein, then a professor of physics in Berlin, rewrote the laws of gravitational physics: In 1907, he had seen a difficulty with his theory of relativity, namely that if all accelerated frames of reference are equivalent, then Euclidian geometry could not hold true in all of them. In 1915, after eight years of excruciating effort, he expanded on his Special Theory of Relativity with Cosmological Considerations on the General Theory of Relativity (“GR”), an entirely new theory of gravity which purported to solve problems with gravity not explained by his Special Theory.

Special Relativity applies to mass at rest. General Relativity, now described by Einstein, applied to a mass in motion. (GR was unknown outside Germany until 1918, after WW1. Eddington introduced it to non-German scientists.)

Einstein used non-Euclidian geometry (hyperbolic geometry) developed by Carl Gauss, Bernhard 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) & gravitational mass (mass based on measuring gravitational intensity) are identical. Special Relativity deals with space with no mass, a flat universe (which of course does not exist). A curved universe, General Relativity, has mass, i.e., stars, galaxies, black holes.

Physics: 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. 

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 Euclidian spacial dimensions.

Physics: 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, etc.) present. Einstein’s GR equations described either a contracting or an expanding universe, but 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 sought to combine the two different field-producing causes (a magnet and an electric current) into one theory.
To one on a rocket ship going the speed of light away from a clock on Earth at noon and looking back will always see noon on the face of the clock, as he is going as fast as the light emanating from the clock on Earth. Similarly, a man on the ground will see noon on a clock on the spaceship even if his wristwatch says 2 pm. If the spaceship abruptly reverses and goes to Earth at the speed of light, his watch and the clock on Earth will then show the same time.

1916

George Bernard Shaw (1856-1950), Irish, in *Androcles & the Lion*, "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. Shaw declared that the reality behind the popular belief in God was a creative spirit in ourselves called by him the Heavenly Father & called by us Evolution, Elan Vital, Life Force & other names." Shaw said, "Do not do unto others as you would have them do unto you. They may have different tastes." (Kant's *categorical imperative* of 1781 was worded to avoid this problem.) Also, "God is on the side of the big battalions." “An Englishman thinks he is moral when he is merely uncomfortable.” “The liar’s punishment is...not that he is not believed, but that he cannot believe anyone else.” “Patriotism is a pernicious psychopathic form of idiocy...Liberty means responsibility. That is why most men dread it” “All great truths begin as blasphemies.”

1916

Astronomy: Henrietta Leavitt devised a way to measure objects far away. She had noted a correlation between the brightness of a certain class of variable star, a Cepheid variable, found in spiral galaxies, & the period of the variation. The brightness of a star depends in its distance to Earth. 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 used this method.

Black Holes

Astronomy, Black Holes: Karl Schwarzschild, German, resurrected John Michell’s 1783 idea that bodies in space exist wherein their gravity is so strong (even though gravity is by far the weakest of the forces) that within a certain distance, an “event horizon”, even light cannot escape their gravitational pull. Physicist John Wheeler coined the term *black hole*, they cannot be seen as they emit no light, but can be detected by their gravitational effect on nearby stars.

Astronomy, Red-shift: Slipher (ref.1912) saw the red-shift from certain cloudy nebulae as much redder than from more distinct sources of light thought to be stars in our Milky Way, indicating they were receding from Earth much faster than stars in the Milky Way, some even at . He wrote, “It has long been suggested that the nebulae are stellar systems seen at great distances. This theory, it seems to me gains great favor.” Most astronomers at the time assumed the universe was the Milky Way, not expanding or contracting. He measured the degree of red-shifts of 13 nebulae & the blue-shifts of two (indicating they were approaching Earth).

1917

John Dewey (1859-1952) American social reformer, activist, philosopher, psychologist, important in pragmatism, in *The Need for a Recovery in Philosophy*, advocated philosophers to forget “pseudo-problems” & deal with the “problems of men.” He argued & acted for a wide range of progressive social reforms over 65 years, signed *Humanist Manifesto*. “Education is not preparation for life; education is life itself.” First 5 chapters of *Origin of Species* was put into Arabic.

c1918

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 and Francis Assisi, John Calvin, and John Wesley.” Sinclair’s 1919 *The Brass Check* exposed corruption in the news industry, especially in the Associated Press. His 1927 *Oil* described President Warren Harding’s corruption in the oil industry in Southern California & in religious revivals. *Sinclair’s Boston* (1928), based on the Sacco-Vanzetti case, indicted Boston’s tradition of privilege.

1918

Oswald Spengler *The Decline of the West*. Cultures are like living things. They are born, mature, decline & die.

Astronomy: Arthur Eddington Brit introduced *General Relativity* to English readers. 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 = 2. We are learning that we need to know more about ‘and.”

Einstein vs. Newton

Einstein said Newton’s gravity produced results close to his but differed in certain respects. Both Einstein and Newton said that light was attracted by gravity, but Einstein’s equations calculated a slightly greater attraction than did Newton’s, the “Einstein shift.” No experiment had verified Einstein’s theory. An associate of Einstein, astronomer Erwin Freundlich, said one could measure how much light rays were affected by gravity by measuring how much the Sun bent light coming around the Sun from a star way beyond the Sun. This could be observed only during a total eclipse of the Sun. Newton thought gravity couldn’t act through empty space.

Physics: Eddington led an expedition to Africa where an eclipse of the Sun could be visible. His measurements there of light coming from a bright group of stars, the Hades, far beyond the Sun, when passing the Sun, bent slightly on their way to Earth. Their deflection verified Einstein’s calculations based on non-Euclidian space-time, not Newton’s. This made Einstein famous. (*Einstein’s* 1921 Nobel was for his work on the photoelectric effect, not relativity.) The difference between using Einstein’s equations regarding gravity are real but so slight that Newton’s far simpler
equations can be and are used for all problems dealing with velocities up to 99+% of the speed of light.

**Physics:** Rutherford (ref.1899,1911,1913), was the first to change one element into another (the goal of alchemists). He bombarded nitrogen (7 protons) with alpha particles (2 protons plus two neutrons). This changed nitrogen into oxygen (8 protons). In 1920, he theorized that particles with some force (gravitational or otherwise) existed in atoms that kept nuclei from breaking apart. Such particles (neutrons) were found in 1932 by James Chadwick.

1919 How we think: Max Planck, “A new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows up that is familiar with it.”

1920 Astronomy: Heber Curtis (Lick Observatory, San Jose, Ca.), speculated that nebulae were distinct separate island universes outside the Milky Way, not gas clouds within the Milky Way as Harlow Shapely (Mt Wilson Observatory, Los Angeles) argued in a “great debate” in Washington, DC. Curtis was soon proven right by Hubble at Mt. Wilson.

1920 Philosophy: Benedetto Croce (1869-1952), Italian philosopher and Minister of Education, “Philosophy removes 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.” (Roger Scruton, Brit, philosopher, Philosophy is committed to at least one all important claim: that there is a real distinction between the true and the false.)

1920s Popper Falsifiability Karl Popper (1902-1994) Viennese, postulated that while universal generalizations (All crows are black) can’t be verified, they could be proven false if a single experiment disproved the statement. So the test of a universal generalization’s adherence to the scientific method (not its inherent accuracy) was its falsifiability, i.e., can an experiment disprove it? (Find a non-black crow.) (A universal generalization usually starts with “All” or “Every.”)

So, as science seeks to make accurate quantified universal generalizations, the test is not verifiability (as the logical positivists asserted), but falsifiability. Popper’s theory has had limited influence.

**Problem of Evil**

Popper said that existence statements can in principle be verified, but can’t be proven false, i.e., “Unicorns exist.” If a unicorn shows up; it’s verified. And, one can’t prove that unicorns don’t exist. But, the Problem of Evil illustrates a limitation to Popper’s theory for hypothetical objects like a square circle, a flat cube, dry water, a live corpse, or a married bachelor, that have definitions which are internally contradictory & so preclude them from existing. Similarly, the Abrahamic God is loving & omnipotent, but doesn’t omnipotently prevent evils & sufferings. So, it cannot exist.

Popper also said that no other thought has been so powerful in the moral development of Man than separating the individual from the crowd. (In 1957, he described the Oedipus effect, i.e., predicting an event may tend either to bring it about or prevent it, depending on people’s reactions.) The impact of our philosophies on our actions and our lives is often devastating. This makes it necessary to try to improve our philosophies by criticism. Like Hume, Popper opposed using induction altogether. Popper said “conjecture and refutation” are key to the scientific method.

1920 Social criticism: Sinclair Lewis’s Main Street, a brutal portrayal of small-minded unimaginative, complacent small towns. In 1922, his Babbitt skewered American businessmen who worship only themselves and money.

1921 James Adams, The Founding of New England, was based on the conflict between the poor & the bigoted theocracy.

1922 Blasphemy John Gott, Brit, was convicted and jailed several times for blasphemy (printing pamphlets ridiculing Jesus), the last in 1921. He was jailed for 9 months with hard labor. The Lord Chief Justice said, “It does not require a [religious] person to be outraged by [his] description of Jesus. Other passages are equally offensive.” Jail broke Gott. He died. Fortunately for Americans, the freedom to “outrage” and “offend” is protected by the US Constitution.

Philosophy: Ludwig Wittgenstein (1889-1951) Viennese, Catholic, “godfather of ordinary language philosophy,” said most philosophical problems are non-issues due to linguistic misunderstandings. The object of philosophy is the logical clarification of thought. The world is the totality of facts (true statements about things) not of things. Language constructs our sense of the world & our experiences. "Whereof one cannot speak, thereof one must be silent:"

Wittgenstein: 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.” “The object of philosophy is the logical clarification of thoughts. Philosophy is not a theory but an activity.” 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. A proposition is factually meaningful only if some empirical facts are relevant to determining its truth or falsity. (ref. Hume’s second type of statement, at 1748)

World is a totality of facts. So Wittgenstein and Russell turned the study of philosophy into the study of logic and language, analytic philosophy, where it reigns today. Analytic philosophy is the philosophical approach following from the empiricism of Locke & Hume, which emphasizes logic, attention to language & simplicity of argument, and seeks to clarify concepts, theories, ideas, and methods. It was distinct from the metaphysical speculation and system building of continental philosophy.
For Wittgenstein and logical positivists, things in a person’s life can have meaning, but a meaning of life itself, apart from those things, can’t be discerned. He said, “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. Logical positivists, believed, like Hume, whatever is neither self-evident nor empirically demonstrable is nonsense. The world is the totality of facts.

1922

Alexander Friedmann, in Zeitschrift fur Physik, posited that the universe could be expanding. Einstein dissed it.

1923

Max Planck (1900, 5, 6, 7, 23), 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 in the future.”

Atomic physics, a new model of the atom: Bohr’s orbiting electrons model of an atom was replaced by waves with modes of resonance, probabilities, extra dimensions.

1924

Biology: First hominids known to modern science, Australopithecines, found in S. Africa by Raymond Dart.

Astronomy: Edwin Hubble (1889-1953), American astronomer with a new (1917) 100 inch telescope at the Mt. Wilson observatory, (could see a candle 10 miles away), in Cepheids in Spiral Nebulae had observed in 1922-3 and published in 1924 that light from the nebula Andromeda was c900,000 light years from Earth, while our solar system, the Milky Way was only100,000 light years across, so Andromeda was far too far away to be within the Milky Way. That is, it was beyond the Milky Way. Using the nebulae in Messier’s 1774 list of cloudy blobs of light, he and colleague Milton Humason soon found 46 “nebulae” beyond the Milky Way. [Now billions have been found.]

Hubble thus confirmed Wright’s 1750 & Kant’s 1755 & Slipher’s 1917 & Curtis’s 1920 notion of stars beyond the Milky Way. When they measured the degree of “redness” of the red-shifts of the nebulae, they concluded that such nebulae (now called galaxies), were receding from us at different speeds & confirmed that the Andromeda galaxy was approaching Earth (blue-shift), one of the few galaxies that does. How? Within a cluster of galaxies, where gravity can have an effect, galaxies can move toward one another. Andromeda is in the same cluster of galaxies as our Milky Way galaxy. Hubble & Humason saw the relationship between the speed a nebula was receding & its distance from Earth, so deduced that the further away, the higher the speed. This relationship is known as Hubble’s Law.

1924

Physics: Louis-Victor, Duc de Broglie argued that matter (like light) must act both as particles and as waves, dual aspects of the same reality. Einstein agreed. De Broglie’s hypothesis was, “Any moving particle or object has an associated wave.” If one accepts that photons (name given to particles of energy from the visible portion of the electromagnetic spectrum, i.e., visible light) move in waves, and that light moves both as a wave and as particles, then all parts of the electromagnetic spectrum must also move in waves and as particles. This created a new field in physics, wave mechanics. This also explained the energy-frequency equivalence discovered by Einstein in 1905. The energy of a photon is proportional to the frequency of its radiation.

1924

Emma Goldman (1869-1940), Russian American feminist, “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.” Also said, “Of all social theories, anarchism alone steadfastly proclaims that society exists for Man, not Man for society.”

1925

Physics: Cecilia Payne showed that the Sun is over 90% hydrogen. The male astronomy establishment ignored it.

c1925

Philosophy: H L Mencken (1880-1956) Baltimore editor & critic, like Bayle, agreed with the logic of the Problem of Evil. “Religion is fundamentally opposed to everything I hold in veneration - courage, clear thinking, honesty, fairness, & above all, the love of truth....The most common of all follies is to believe passionately in the most palpably not true. It is the chief occupation of mankind...Religion, generally speaking, has been a curse on mankind.

Problem of Evil

Change is not progress. Christian theology is not only opposed to the scientific spirit; it is opposed to every other form of rational inquiry. He 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 agonies of man...can only retreat behind Chrysostom’s despairing maxim, that ‘a comprehended God is no God.’

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.

Moral certainty is always the sign of cultural inferiority. The more uncivilized the man, the surer he is “that he knows precisely what is right and what is wrong.”

Dr. Johnson said patriotism is the last refuge of scoundrels. But there is something worse; it is the first, last, and middle refuge of fools. Religious’ modest services on the ethical side are nothing to the damage...to clear thinking.” “A government composed of cynics is 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.”

1925

Biology: John Scopes was tried for teaching evolution in a public school contrary to a Tennessee law. The ACLU hired
1925 Physics, Quantum Matrix: Werner Heisenberg (1901-1976), German, using matrix algebra, developed a system called matrix mechanics which gave the observed tendencies and frequencies of spectral lines. Matrix mechanics is the science of how sub-atomic particles travel, orbit, leap, and produce light. Relativity and Quantum theory are fundamentally different theories that have different formulations. They are incompatible descriptions of reality.

Quantum Mechanics

Physics: Werner Heisenberg's matrix mechanics (a formulation of quantum mechanics that does not involve a wave function.) had an electron with quantum behavior. Erwin Schroedinger (1887-1961) produced the basic wave equation of quantum mechanics. Schroedinger's wave mechanics interpreted the electron as an energy wave.

Physics: Heisenberg and Schroedinger then discovered mathematical procedures that accurately replicated many of the observed properties of atoms, thus giving birth to quantum mechanics, a synthesis of Schroedinger's wave mechanics & Heisenberg's matrix mechanics. Quantum mechanics says a particle is a traveling cloud of probabilities. The only way, so far, to observe a particle within an atom, a sub-atomic particle, is to hit it with another particle and see what happens, so necessarily disturbing the measured particle. Thus, for sub-atomic particles, to measure is to disturb, giving rise to Heisenberg's Uncertainty Principle, i.e., one can't measure both the momentum and position of a sub-atomic particle (such an electron) 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, complementarity.

An electron's speed and its position fit together in such a way as they are limited by the tolerance of the quantum. Heisenberg rejected causality, said that the assumption that "behind the statistical universe of perception there lies a real world ruled by causality" is "useless & meaningless" as "we can never measure sub-atomic conditions."

Quantum theory conflicts with Newton's ideas of time & space for sub-atomic particles. But Newton's laws continue to accurately govern macroscopic objects. What made the Uncertainty Principle profound is that Heisenberg specified the tolerance that can be reached, i.e., Planck's quantum. But Einstein's GR equations, his theory of gravity, was also incompatible with quantum mechanics equations. Relativity & quantum mechanics were born in Europe, came to the US in the 30s. Referring to the uncertainty principle, Einstein said, "I am convinced that he [God] doesn't play dice."

Einstein 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." Popper 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. Quantum mechanics and relativity are fundamentally different theories that have different formulations. They are genuinely incompatible descriptions of reality.

1927 Niels Bohr (ref.1913, 1923, 1933), incorporated the Uncertainty Principle (applicable only to sub-atomic particles) into his concept of Complementarity. Bohr elevated Complementarity to a fundamental principle. It includes the Complementarity between the wave and the particle theory of light. Light can be viewed as a wave, for example, when it is diffractions 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.]

1927 Physics: Paul Dirac (1902-1984), Brit, proved that Heisenberg’s particle approach & the wave approach of Schroedinger were mathematically equivalent. The quantum world is particle & wave at the same time. Dirac devised a new equation for the electron, the most profound & significant general formulation of quantum mechanics. Dirac developed the theory of the spinning electron. He also realized that the equations of quantum mechanics allowed for “anti-matter” to exist next to the usual matter, for example a positively charged electron exists that looks just like the electron but has the opposite charge. He developed an equation incorporating both the
quantum theory & the theory of special relativity. He laid the groundwork for quantum electrodynamics, see 1950s. His 1930 Principles of Quantum Mechanics became one of the standard textbooks on the subject and is still used.

Physics: Thus quantum theory developed in an very short period, mainly 1924-27. By the end of the 1920s, the idea of light having characteristics of both a wave and as particles had become, due to Bohr, the foundation of a complete theory of the subatomic and atomic world, called quantum physics. Bohr, a founder of quantum physics, “Anyone who is not shocked by quantum theory has not understood it.” Physical “reality” became more elusive. Dirac predicted that electrons with a positive charge existed. This was confirmed in 1932 when American physicist Carl Anderson detected positrons. Dirac also predicted that every particle possesses an antiparticle (antiproton, antineutron, etc.). 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 hoped to do is predict the probability that things will happen a particular way, often a high probability.

1927 Solvay Conference

Physics: Most of the leading physicists in the world, including nine Nobel laureates (virtually all Europeans) attended the 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, “We regard quantum mechanics as a complete theory for which the fundamental physical and mathematical hypotheses are no longer susceptible of modification.”

Physics: Thus, three sets of laws now explain the behavior of the universe, quantum theory for the world of the subatomic, relativity for the very large universe beyond, and classic Newtonian physics for everything in between.

Newton’s gravity well explained why planets orbited stars or why galaxies tended to cluster but had no effect at the sub-atomic level. It also did not explain what kept atoms together. (See 1934, Physics)

Philosophy: Martin Heidegger’s (1889-1976) Zeit und Sein / Being and Time 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. His writings influenced existentialism.

1927 Big Bang

Cosmology: Georges Lemaitre (1894-1966) Belgian priest, extrapolated backward from an expanding universe & deduced that the universe began when it exploded from a geometric point, a singularity. This theory was called the Dynamic Evolving model of the universe. Einstein was again critical, said Lemaitre’s math was OK but the physics was abominable. It was not generally accepted as the then prevailing theory was that the universe was static.

Bertrand Russell quotes.

Philosophy: “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 therefore there is no reason to consider any of them.” 1925

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.”

“The fact that an opinion has been 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.

Most people are silly

Cosmological Argument

Russell answered the Cosmological / 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 as God, so that there cannot be any validity in that 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 they said, "What does the tortoise stand on?" The Indian said, "Suppose we change the subject."

Russell also disputed the Cosmological Argument that the universe was contingent, simply because objects within that universe are contingent, which they certainly are. This is the fallacy of composition (see p.188 for fallacies)

1928 Cornelius Van Til (1895-1987), Dutch American, instituted a school of thought popularly called Presuppositional apologetics. Van Til thought “transcendental” would be more accurate. Presuppositionalists don’t believe the existence of God can be proven by appeal to raw facts, but God’s existence can be 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 for the Christian God’s existence, as God’s existence is the necessary condition of their intelligibility. Critics say that it assumes the truth of Christianity & the falsity of other religions.

1928 Philosophy: Rudolph Carnap (1891-1970), German, in the “Vienna Circle.” The Logical Structure of the World. Strong 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 merely formal and expressed in tautological propositions.

1928 Charles Smith was convicted twice in Arkansas for blasphemy. As an atheist, he couldn’t be sworn in to testify.

1929 Astronomy: Hubble’s powerful telescope let him identify individual stars in nebulae. Thus nebulae were groups of stars. Hubble and Humason saw that the degree of the red-shift in light from distant galaxies showed that the further away
Edwin Hubble

the galaxy, the redder the shift, i.e., the faster it was receding, directly proportional to the distance from Earth.

This was then the strongest evidence for Lemaître's Dynamic Evolving model, i.e., the universe was expanding from a singularity. In retrospect, they realized that a static universe would collapse in itself due to gravity. Although Hermann Weyl and Carl Wirtz years earlier had noted the relation between between red-shift and distance, it became known as Hubble's Law. Distances between galaxies are so great as to minimize any gravitational influence among them. Galaxies and clusters of galaxies and solar systems are close enough to be gravitationally bound together and so do not expand as there is equilibrium between expansion and gravity. Hubble classified galaxies according to their shape (spirals, ellipticals, lenticulars, irregulars), in the still-used Hubble Sequence.

1929

The Great Depression

Background, the Great Depression: The central banks of the four superpowers, US, England, Germany, and France, who printed their nation’s currencies, were privately owned and not regulated. They sought to restore the gold standard, abandoned during WW 1. Speculators pushed up stock prices to absurd levels. The bubble burst, the market crashed; the Great Depression began in the US, and spread worldwide. John Steinbeck, Grapes of Wrath described the depression, “A red is any son-of-a-bitch who wants 30 cents an hour when we’re paying 25”

Pius 11 signed the Lateran Pact with Mussolini whom he praised as “a gift of Providence, a man free from the prejudices of the politicians of the liberal school.” Mussolini had declared himself Il Duce (Leader) in 1926.

Epistemology: Jean Piaget (1906-1980), Swiss, pioneer of the constructiveness theory of knowing. Children develop how to learn in different ways at different stages of development and learn moral development in stages. JBS Haldane speculated that life began on Earth when ultraviolet radiation acted on a soup of CO2, H2O, & NH3.

Boas and others said the bases of claims of genetic intelligence differences among racial groups were unscientific.

Cosmology: Eddington showed that Einstein’s universe was not really static, as gravity and the cosmological term were so precariously balanced that a small perturbation would cause runaway contraction or expansion. Einstein accepted the expanding universe theory, and in 1931, went to Mt. Wilson to thank Hubble. He there announced that Friedmann and Lemaître were right and the universe was expanding. Einstein said their theory was most beautiful and satisfactory. He abandoned his cosmological term, which he termed his greatest blunder. Humason eventually measured the recession speed of 800 galaxies. Hubble then calculated the distances to these galaxies.

Math. Kurt Godel announced two Incompleteness Theorems. 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.

Particle Physics: Ernest Lawrence invented the cyclotron, enabled scientists to explore inside atoms.

Robert Millikan (1868-1953) physicist, Nobel 1923, three ideas stand out as the most influential for the human race, The idea of the golden rule, The idea of natural law [science], & The idea of age-long growth, or evolution.

JBS Haldane & R A Fisher reconciled Darwinism with Mendel’s genetics in the grand synthesis, which caused both to become widely accepted. Basically Mendel explained where Darwin’s variations came from. Evolution by Natural Selection is simple & profound & is now universally accepted by scientists, but not by some religious sects.

Physics: James Chadwick proved Rutherford’s 1911 theory (atoms have tiny dense positively charged nuclei surrounded by negatively charge electrons) by discovering neutrons (same mass as protons but no electrical charge so they aren’t repelled by protons) in an atom's nucleus, which, with protons, electrons and tinier bits, comprise atoms. Some atoms of an element have a different number of neutrons, which atoms are called isotopes. (Carbon 12 has 6 protons and 6 neutrons. Carbon 14 has six protons and eight neutrons.) (Nobel in physics 1935)

Political Theory: Aldous Huxley’s Brave New World (phrase from Shakespeare), set in 2540, described an anti-utopian totalitarian world where genetically superior Alphas use total mind control and a pleasure drug, soma, to rule over genetically engineered inferior working clones / castes. The state runs a religious organization using soma which eliminates the need for any religion outside state control. Everybody knows their place in society and is obedient and happily drugged up. The plot revolves around a few rebels.

Astronomy: Jan Oort (1900-1992), Dutch, deduced that the density of matter near our Sun was almost twice what could be explained by visible planets and known gas (gas is matter). This was the first evidence of invisible matter with a gravitational force that kept the known (visible) matter from flying into space. (See Zwicky, just below)

Astronomy: Like Oort, Fritz Zwicky, Bulgarian-American, saw the gravitational effect of eight galaxies in the Coma cluster was 400 times stronger than the presumed mass in the cluster that was needed to keep the galaxies
gravitationally bound in the cluster. He had calculated the mass from the brightness of its stars. He concluded that there had to be some non-visible matter (i.e., with gravitational effect) in the cluster that was keeping the cluster together. He called this non-visible but presumed matter, dunkle Materie, dark matter. Zwicky published this in the Helvetica Physica Activa, a little-read Swiss journal. No notice was taken of it until 1970.

1933 Quantum physics: Niels Bohr, offered a principle he called complementarity, a recognition of an inescapable duality at the heart of things. “We have to renounce a description of phenomena based on the concept of cause and effect.”

1933 Hitler Political theory, Fascism: In Mein Kampf / My Struggle (1925), Adolph Hitler said, “By defending myself against the Jews, I am fighting for the Lord,” & “Female education is for motherhood.” Hitler energized the volk blaming Jews, Marxists, & foreigners for Germany’s ills. (Mussolini blamed foreigners.) Hitler argued that Jesus was not a Jew. Anti-Semitism was deep in German culture in any case. He made a pact with Pope Pius 11 wherein German Catholic clergy must honor his government & could not be active in political parties. He allied his government with corporations, suppressed labor unions, purged German science from the “taint” of non-Aryan (Jewish) thinking, caused Jewish scientists to be fired. He denigrated democracy as inefficient. Germany, a literate, educated country, accepted his madness. He gave them a scapegoat & hope. Top Jewish scientists left Germany, later built America’s atom bomb.

1933 Physics: Einstein fled Hitler for England and the U.S. He considered nationalism an infantile disease. Like others, he sought a Unified Field Theory, to unite gravity and electromagnetism, the two then-known fundamental forces.

Astronomy: Arthur Eddington said that the Sun was millions of degrees hot, also confirmed that the galaxies were flying apart. Bell Labs discovered that radio waves were coming not just from the Sun, but from stars all over the universe. This was the birth of radio astronomy which can detect stars beyond the vision of telescopes.

1934 Spengler (1918), Christian theology is the grandmother of Bolshevism. Socialism is the capitalism of the lower classes.

1934 Physics: Leo Szilard, Hungarian, realized that if one hit an atom with a neutron, and it broke up and released two, one would have a chain reaction. He also described Information Theory, the relation between knowledge, nature, & Man.

In the 30s, two new forces were discovered, the strong nuclear force and the weak nuclear force. The strong nuclear force keeps atoms together and the weak nuclear force controls certain kinds of radioactivity. The weak nuclear force is still 10BBB times stronger than gravity. The strong nuclear force is vastly more powerful, but reaches out only 1/100,000 the diameter of the atom. Enrico Fermi, Italian, formulated a theory of the weak nuclear force that predicted a new particle, the neutrino.

1934 Ruth Benedict’s Patterns of Culture: Different customs & standards of social behaviors arise in different cultures.

1935 Ecology: Arthur George Tansley coined the term ecosystem; it united biology, physics, chemistry, and other scientific fields to describe the environment. An ecosystem functions as an ecological unit.

1936 Economics: John Maynard Keynes, Brit., (1883-1946) said the gold standard was “a barbarous relic.” His General Theory of Employment, Interest, and Money asserted that the financial markets needed government intervention and regulation, including printing money for public works to fight unemployment during slumps. The market is not “efficient,” as short term speculation dominates it, not a more rational long term analysis.

“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. Practical men who believe themselves exempt from any intellectual influences, are usually 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 academic scribbler of a few years back. The power of vested interests is vastly exaggerated compared with the gradual encroachment of ideas.”

1936 Nuclear physics: Hans Bethe (1906-2005) with two others wrote three authoritative articles on nuclear physics.

A-J Ayer, Logical Positivism

Philosophy: Alfred-Jules Ayer, in Language, Truth & Logic, articulated logical positivism, developed by a group of Viennese & German mathematician / philosophers influenced by Wittgenstein, skeptical of theology & philosophy. An idea is cognitively meaningful only if there is a way to prove or disprove it. Logical positivists rejected Kant’s belief in innate capabilities in the brain which enable Man to understand phenomena, a priori knowledge. The philosopher as an analyst is not concerned with the physical properties of things, but only with the way in which we speak about them.

A-J Ayer quotes

“Scientists can speak meaningfully as there is a common understanding of the words they use and their assertions can be proven or disproved by experiment, observation, and measurement.” “Philosophers / theologians cannot speak meaningfully as the words they use have different meanings to different people.”

“To say ‘God exists’ is to make a metaphysical utterance which cannot be either true of false as it can’t be verified
or falsified...” [This, as previously noted, depends on one’s definition of God.]

For logical positivists, statements about the supernatural are meaningless as metaphysical naturalism, the basis for logical positivism precludes supernatural entities without proof.

Ayer then said, No sentence which purports to describe the nature of a transcendent god can possess any literal significance. In other words, the characteristics attributed to the Christian God can not be verified.

1937 Noblety: Rutherford had a hernia. As a baron, a titled doctor was required to operate. The delay cost his life.

1938 Semantics: Ed Sapir and Ben Whorf: Cultures whose languages have a different structures see the world differently. People understand the world through the words they know. Stuart Chase’s Tyranny of Words showed there was little agreement on the meaning of most philosophical concepts.

The Encyclopedia of Philosophy says, “No problems of knowledge are less settled than those of definition.”

50,000 Stone Age Papuans were discovered in the Grand Valley, a valley in remote mountainous New Guinea.

1938 FDR 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.”

1939 Chemistry: Linus Pauling’s The Nature of the Chemical Bond explained the bond. (cited over 16,000 times in scientific papers.) He introduced the concept of orbital hybridization and the relationship between ionic bonding and covalent bonding. He was the father of molecular biology. He most importantly applied quantum theory to chemistry. He was awarded the 1954 Nobel Prize in chemistry and 1962 Nobel Prize in peace.

1939 Fusion Physics: Hans Bethe: In the Sun, two hydrogen atoms (1 proton each) fuse to become helium (2 protons), and lose a tiny bit of mass. That lost mass is sunlight / energy. (So the Sun burns for billions of years without burning up entirely.) Fusion then created heavier elements. 90+% of the atoms in the universe are hydrogen; most of the rest are helium.

1939 Carbon dating Physical Chemistry: Willard Libby, University of Chicago, developed radioactive carbon dating (Nobel prize 1960) enabling one to determine when carbon based substances existed. (An isotope of carbon, Carbon 14, decays into Carbon 12 by one half each 5,600 years. So determining what proportion of Carbon 14 is left in a piece of carbon determines when the organism died. The method is only accurate up to c40,000 years.

1939-45 World War Two World War 2: In 1937, Japan massacred 200-400K at Nanking. In 1939, Hitler invaded Poland. War. In 1941, Japan attacked Pearl Harbor (as predicted in 1909 in astonishing detail by Homer Lea, an American military genius). The US allied with England (& all its colonies) & France to defeat Germany, Italy, & Japan. Germans killed c6M, mostly Jews. (Jews believe that their God would never desert them.) Europe was flattened. The USSR lost 20M people. American industrial might and a fission atomic bomb on Japan won. Never before in history was there such a total victory. It caused the spread of universal suffrage and the idea of democracy. No Germans, not even Hitler, was ever excommunicated for his crimes against Jews. Inequality of wealth declined due to social programs & high taxes.

1940 Free Will Defense to the Problem of Evil Philosophy, Problem of Evil: C.S. Lewis (1898-1963), a popular writer, posited a Free Will defense to the Problem of Evil in his book, The Problem of Pain. He argued that God had only two choices, to create persons without any free will like automatons or people with absolute free will to do evil. He said God decided that the benefits of free will outweighed the evil & suffering that people might cause.

Saying God had only two choices was a false dilemma. There were other possible alternatives between these two extreme choices. An omnipotent God could make moral men who wouldn’t freely choose to do evil, as Mackie said in 1955. Many persons, believers & non-believers, live lives without doing evil or causing suffering to others. Lewis also argued that God gave humans free will as it is the only thing that makes love or joy or goodness worth having. Lewis felt that the doctrine of Hell was intolerable, but that it could be shown to be moral by a critique of the objections made against it. Lewis admitted that Christianity thrives on guilt, the fundamental emotion that the Church seeks to induce..

1941 Edward Dowling: Jesuit priest. The two greatest obstacles to democracy in the U.S. 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.

1942 Philip Wylie: “The Church has stood, a rock colossus of bigotry, in the path of 10,000 proposed reforms.”

1943 Philosophy: Jean-Paul Sartre (1905-1980), in Being and Nothingness, articulated existentialism, an atheistic attitude rather than a philosophy. Man is alone, there is no blueprint of what Man should be, no ultimate significance to the universe until he makes one for himself. “Man is condemned to be free.” Man must make choices, which is the basis of his liberty.

Sartre argued that even if God existed, it would be necessary to reject him (like Bakunin), 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. Instead we must see human beings as liberty incarnate.” Sartre also denigrated humanist values. Moral decisions can only be made by Man and then only for himself. The flaw in this is that it justifies any act.
1943 **Joseph Campbell**: *The Power of Myth*, “Life is without meaning. You bring meaning to it. Being alive is the meaning.”

1944 **Aldous Huxley**, “Religion, it seems to me, can survive only as a consciously accepted system of make-believe.” and, “Science has “explained” nothing; the more we know, the more fantastic the world becomes.”

1944 **Geology, Plate tectonics**: Arthur Holmes, Brit, further developed plate tectonics, positing that continental drifting is based on the sea floor spreading rather than Wegener’s theory of continents pushing or being pushed apart in the sea. In the 1950s & 1960s new evidence emerged which supported the concept. It has now been universally accepted. There are 8-12 big plates and 20 or so smaller ones, ranging in thickness from a few miles to 60 miles.

1945 The UN 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.” **Ho Chi Minh** quoted **Jefferson’s Enlightenment** statements regarding the equality of men and “inalienable rights” in his Declaration of Independence for Vietnam.

1945 **George Orwell’s** *Animal Farm* was scathing allegory of the Soviet system. “All animals are equal but some are more equal than others.” The U S Army had its soldiers collect all copies for the Soviets to burn.

1946 **Morris Cohen**, American philosopher, “If religion cannot restrain evil, it cannot claim effective power for good.”

1947 Indian Independence: **Jawaharlal Nehru**,(1889-1964). Indian statesman, with **Mohandas / Mahatma Gandhi** (1869-1948), led India to independence. Britian split India into mostly Muslim Pakistan & mostly Hindu India. But foolishly gave Muslim Kashmir not to Pakistan but to India as its ruler was a Hindu, causing needless killing that continues. As some other Muslims lived in Hindu territory, & vice-versa, they fought. 1 million died, 15 million were displaced, due to their religious differences. **Gandhi** said poverty was a virtue. **Nehru**, a Brahmin & jailed for 12 years, disagreed.

Re **Hinduism**, **Nehru** said, “No country or people who are slaves to dogma & dogmatic mentality can progress. I want nothing to do with any religion that keeps the masses satisfied to live in hunger, filth, & ignorance.” **Gandhi** said, “I like your Christ. I do not like your Christians. Your Christians are so unlike your Christ.” and “God has no religion. The truth is just the truth.” Despite official government opposition, the Hindu rigid caste system continues.

1947 **Theology**: **CS Lewis** (ref.1940) defended the **Argument from Reason** in his book, **Miracles, a Preliminary Study**. He argued that naturalism “impugs the validity of reason and rational inference,” and as such, naturalists contradict themselves if they use reason to defend their beliefs. One contrary argument is that it is inconsistent to say that if naturalism is true then say there is no such thing as valid reasoning.

He also articulated the **Argument from Desire** (Humans have an innate desire for joy beyond the natural world, there must be an object to satisfy that desire, therefore God). Philosopher **John Beversluis** in 1985 disputed the existence of such “universal desire,” saying many people were perfectly happy with their lives without such desire Lewis also advocated the **Argument from Morality** (People have a sense of right and wrong and the only explanation of this is God. **Beversluis** (see 1983) said this was a circular argument.

1947-56 **Dead Sea Scrolls** found; showed Zoroastrianism’s (Satan vs.God, judgment day, expect a Messiah) influence on Jews.

1948 The **UN Declaration of Human Rights** stated as fundamental rights, the right of free movement in search for truth and the attainment of moral good and of justice, and also the right to a dignified life. Pope **John 23** repeated this in 1963.

1948 **Cosmology**: **George Gamow & Ralph Alpher** published The Origin of Chemical Elements, a defense of Lemaître’s theory of an explosion at the beginning of the universe, then called the **Dynamic Evolving model**, which fully mathematically explained the creation of hydrogen & helium, which elements comprised 99.99% of the atoms in the universe. Their theory also posited that there should be cosmic microwave background radiation (CMB) from the initial explosion still existing in the universe. Their theory did not answer how heavier elements came into existence.

1948 **Claude Shannon’s** A Mathematical Theory of Communicating created **Information Theory**. The basic idea was that information could be broken down into quantifiable entities he called digital digits (now bits). Digital = **Shannon**.

1948 **Cambridge cosmologists** Thomas Gold, Hermann Bondi, & Fred Hoyle proposed an expanding but unchanging model of the universe that became known as the **Steady State model**. Their model was consistent with a wide range of astronomical observations. It posited that new baby galaxies developed in between older galaxies as the universe expanded. This contradicted **Lemaître’s Dynamic Evolving model** (all galaxies were formed from one event.) No telescope at the time was powerful enough to see such baby galaxies. So, Dynamic Expanding Model was challenged.

1949 **George Orwell’s** (1903-1950) 1984 was a bleak picture of a totalitarian future. It coined doublethink, Big Brother, thought crime. “Thought crimes” always had been and are still Christianity and Islam’s greatest sins. **Orwell** said, “In a time of universal deceit, telling the truth is a revolutionary act.”
Belief in an imminent Second Coming was promoted by fundamentalists, including Billy Graham, America’s most prominent evangelical. Believing the world will end soon makes long term planning senseless, wasteful. The educated classes in the West, however, had largely left actual belief in God for the social attractions of churches.

Physicists: Many scientists, including Einstein, continued to try to discover a Unified Field Theory to reconcile the four then-known forces (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).

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.”

God of the Gaps Argument
Einstein: “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 called the “God of the Gaps” argument, i.e., that gaps in the evolutionary fossil record disproves evolution and as there are many unsolved scientific problems (i.e., gaps in scientific knowledge); thus there must be or have been a supernatural creator as only a supernatural power can explain such gaps and answer the unsolved questions.

Before scientific thinking, (under 3,000 years ago), everything was explained by gods. Not now. There are unsolved questions in all sciences. Scientists answer that 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 will continue to do so. Some theists feel it is a tactical mistake to base belief in a God on gaps in scientific knowledge, as those gaps narrow daily.

Einstein said, “When asked to summarize the general theory of relativity in one sentence: Time and space and gravitation have no separate existence from matter. ...Physical objects are not in space, but these objects are spatially extended. In this way, the concept ‘empty space’ loses its meaning. Since 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.

Cosmology: Hoyle (Steady State theorist) derisively termed Lemaitre’s 1927 theory the “Big Bang” theory. The quip soon became the accepted name for the Dynamic Evolving model. An expanding universe working backward of course gave clues as to when the Big Bang bung. Big Bangers c1953 thought the universe was c1.8 billion years old. This soon changed. Thus two competing theories of the universe, Big Bang vs. Steady State. Events in 1953, 1961, 1964, and 1992 finally decided that Big Bang was the accurate theory.

Stupid people are sure. Smart people doubt
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 in the modern world the stupid are cocksure while the intelligent are full of doubt...The finding of arguments for a conclusion one wants to reach (like arguments by theists purporting to prove God exists) is not philosophy, but special pleading...To conquer fear is the beginning of wisdom (1950)...There is not one word in the Gospels in praise of intelligence...Fear is the parent of cruelty...it is no wonder if cruelty and religion have gone hand in hand. Fear is the main source of superstition, and one of the main sources of cruelty.”

Dogma: Pope Pius 12’s Humani Generis encyclical, permitted Catholics to discuss evolution but Catholics must believe that God put a soul into Man at some undefined point, and “[evolution] should not be accepted as valid without more evidence.” In 1951, Pius 12 said the Big Bang was the Biblical time of “Let there be light” and proof that God existed. Lemaitre, a priest, demurred, said his theory “remains entirely outside any metaphysical or religious question.” Monsignor William Green said that death in battle was part of God’s plan for populating “the kingdom of heaven”.

Stanley Miller, U. of Chicago, reconstructed the atmosphere of Earth at 4B BC. Several amino acids appeared.

Walter Baade, German-American showed that the distances to galaxies was almost two times larger than then thought.

In the 1950s Richard Feynman, Julian Schwinger, & Sin-Itiro Tomonaga combined electromagnetic theory with quantum mechanics to found quantum electrodynamics, more accurate than Maxwell’s equations. In this theory, electrons interact with each other by exchanging photons. As photons can’t be observed, they’re called virtual photons.

The USSR made a hydrogen fission bomb. The doctrine of Mutual Assured Destruction ("MAD") ensured that neither USA or USSR would use the bomb. The doctrine assumes the possessors of nuclear weapons act rationally.

Cosmology: It was seen that the Big Bang could explain how helium came into being but that the Steady State model could not. In the contest between Steady State v. Big Bang, Advantage to Big Bang. (See 1961, 1964, and 1992)
1953  **Physics/Chemistry, DNA:** Rosalind Franklin, Maurice Wilkins, James Watson (PhD at 22), and Francis Crick, found that every cell in an individual living thing contains a DNA molecule for that individual, shaped like a double helix (2 spiral strings), each of which strings contains all the genes which each contain a characteristic of that individual, the total genetic pattern for that individual. When a cell divides, one helix/string goes to each new cell, which then grows an identical helix, and so on, so each new cell has all the genes of the prior cell.

The structure of a DNA molecule can be seen with an electron microscope, and portions of the strings determining hair color, etc, 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 expressed in the brain. There are about 100 billion neurons in the brain. Each neuron connects with about 10,000 other neurons.]

The three most important discoveries in biology have been Mendel's defining the gene as the unvarying bearer of heredity traits, Oswald Avery's identification of its chemical makeup, and Crick and Watson's elucidation of the double helix structure of its replicative basis. (Some biologists now believe the membrane of a cell is its true nucleus.)

1954  **Henry Steele Commager,** A free society cherishes non-conformity. It knows that from a non-conformist have come many of the great ideas of freedom...Loyalty...is a realization that America was born of revolt, flourished in dissent.

1955  **Theology:** Mackie, John L (1917-1981), Australian philosopher, atheist, answered the Free Will defense to the Problem of Evil. His book *Evil and Omnipotence* stated, “There was open to [God] 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 wholly good.” That is, God could have made Man morally perfect so that Man would have free will but never choose to do evil. [Giving only two alternatives, no free will or absolute unrestrained free will is 1. setting up a straw man, and, 2. positing a false dilemma, both logical fallacies [p.188].] With unrestrained free will its possible some or all would choose always to do evil, not a good recommendation for free will. Mackie’s *Ethics, Inventing Right and Wrong* opens with, “There are no objective values.” So ethics must be invented, not discovered.

1956  **Pierre Teilhard de Chardin** (1881-1955) Jesuit, French, from a wealthy family, a palaeontologist, accepted Darwinism, so exiled to China in the 1920s by the Jesuits for fear he would influence intellectuals and other Jesuits with belief in evolution. When he died, he had written six books which the Jesuits had forbidden him to publish. His secretary then published *The Phenomenon of Man*, “With the evolution of Man, a new law of Nature has come into force - that of convergence.” Biological convergence (Darwinism) had created step one, “expansive convergence.”

Now, with 20th century technology (radio, telephone, etc.), God was creating “compressive convergence.” Man was being united by a “nervous system for a thinking machine,...a unified consciousness that would cover the Earth like a thinking skin,...a noosphere.” This two step theory of evolution was the foundation of his world view. He dreamed of a Christian unity of all souls on Earth. He also posited a form of the Design Argument.

1957  **How we think:** Leon Festinger’s 1957 *A Theory of Cognitive Dissonance* coined that term and showed how tenaciously people cling to their beliefs, when confronted with facts contradicting those beliefs,(including using fallacious reasoning. See p. 190). Recall Max Planck said in 1919, “A new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because [adherents of the old beliefs] die.

Mark Twain had described this tendency in 1909. “When even 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 do it myself.”

Not only believers in supernatural belief systems, but scientists are reluctant to accept concepts or facts that contradict their beliefs. All men tend to interpret new “facts” to confirm their current beliefs. [called also motivated reasoning and confirmation bias]. Persons confronted with evidence negating their beliefs will even declare the facts irrelevant.

1958  **How we think:** Lev Vygotsky (1896-1934) Russian, We learn to think based on concepts/words we know. He founded cultural-historical psychology. His theories were known in Russia in the 1930s but not known in the West until 1958. Thought is restructured while it is transformed into speech.

1959  **C P Snow’s The Two Cultures** (humanegetics and science) described how scientists and humanities intellectuals shortsightedly did not understand or sympathize with each other and spoke different languages. The divide persists.

At an event marking Origin of Species’s centennial, geneticist H J Muller, Nobel laureate, decreed that even after 100 years, “creationism” was still popular and even well-educated people did not fully understand natural selection.

**Big Bang vs. Steady State**

Cosmology: Big Bang modelers 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 said young galaxies should be distributed evenly throughout the universe. Radio astronomy indicated that younger galaxies appeared mostly in the far reaches of space as the Big Bangers...
**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.

**Chaos theory:** Edward Lorenz, meteorologist, developed a computer model based on 12 main factors determining weather 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, but are “non-linear,” small changes in variables can cause multiple changes. (see 1975)

**History of Science:** Thomas Kuhn (1922-1996) a physicist, changed the way scientific progress is understood. The then prevailing view was of incremental additions to the body of knowledge through the scientific method. Kuhn posited that there have been a number of great scientific revolutions that changed basic assumptions or world views regarding a particular science, like those of Copernicus, Kepler, Galileo, Newton, Lavoisier, and Einstein, and intermediate minor ones. He called such world views paradigms.

A paradigm is simply the dominant prevailing theory or the then “ruling hypothesis” in any given science. Experimenters have shared views regarding problems to solve. This phase is called “normal science.” A paradigm shift occurs when a new theory emerges that forces scientists to change their way of looking at natural phenomena. The new paradigm is better able to solve problems within that science than the old paradigm. A paradigm focuses experimentation.

Kuhn said science progressed in three distinct stages. 1. pre-science, which developed a particular world view, a paradigm. 2. a period within which “normal” science progressed productively (like 300 years of Newtonian physics) until anomalous results became apparent which required 3. a new way of looking at natural phenomena, i.e., a new paradigm (like Einstein’s relativity), which subsumed Newtonian physics which then progresses within that paradigm until a new paradigm emerged to answer problems with the previous paradigm. Aristotle’s paradigm, purpose as the driving force in nature, prevailed for a millennium, and distorted science somewhat. Similarly, the geocentric conception of the Earth’s place in the cosmos, was comfortable for the Church, lasted until Copernicus.

**Dogma:** Vatican 2 Council, generally liberal (Slavery is a sin), but reaffirmed the 1870 claim of papal infallibility.

Saudi Arabia officially outlawed slavery, but the Wahhabist / Islamist extreme subjugation of women continued. In the 1950s, slave markets operated in Djibouti to supply the Arab Emirates. Mauritania & Sudan had slaves in the 1960s.

**Epistemology:** Edmund Gettier posited situations of justified true belief that are not “knowledge.” A believes X, but doesn’t know why. B believes X and knows why. B’s belief is knowledge as it is justified, A’s is not as it isn’t justified.

Another theodicy. Soul-making: John Hick (1922-2012), Christian theologian, to defeat the premise of the Problem of Evil, argued that a Biblical God gave men he created free will, which allowed them the power to sin as God’s purpose was not to make the world a “permanently hedonistic paradise” but a place for “soul-making” where men would suffer and thereby become “children of God.” He argued that making men so good they would not sin (Mackie’s 1955 argument) is not possible as that would mean men would be mere mechanisms, passively acting out God’s will. Without evil and suffering, moral traits such as courage, patience, and sympathy could not develop.

Hick’s theory has flaws. Hick purported to know God’s purpose, but God is “incomprehensible.” Hick’s argument is also flawed in that some suffering is so debilitating, so severe (the holocaust, starvation, mental disease, murder), that it would prevent the sufferers from being able to develop the required moral stature for soul making. Plus, animal and infant suffering can not serve any soul-making purpose. And, saying that the only alternative to evil people is a “permanently hedonistic paradise” is a straw argument, a false dilemma, limited choice. Hick admitted that it does not always work out but that such God would make it up in the afterlife. Also, Hick’s argument assumes that the Biblical God exists, the concept it purports to prove. An argument that assumes the Biblical God (or anything) exists cannot be used to prove such a God (or anything) exists. Hume in 1751 refuted the free will defense.

**Dogma vs. reason:** Hick was best 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 such religions were but different paths to the one transcendent reality, God.

For this reasonable & charitable view, he was twice the subject of heresy proceedings by the Anglican Church. He was also attacked by then Cardinal Ratzinger (later Pope Benedict 16). The churchmen were right. It is ‘heretical’ for Christians to assert other religions are as valid as their own. Hick argued that Christianity is the only way to true salvation; that the Sermon on the Mount was the basic Christian teaching. He became a Quaker in 2009.
1964 Rabbi Sherwin Wine, a founding person of Humanistic Judaism, coined “Inostic;” one who can’t say if he’s an atheist or a theist until a sufficient definition of theism is proposed.

1964 Biology, RNA: Robert Holley, Marshall Nirenberg, & Har Khorana isolated transfer RNA & determined the sequence & 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 the discovery of the double helix structure of DNA in 1953.

1964 U.S. Supreme Court: The central meaning of the First Amendment is to protect uninhibited speech of public issues.

1964 Particle Physics: Protons were found to be made up of hadrons which were made up of different kinds of quarks. c500 billion protons can fit in the dot of an “i” and a proton weighs c1840 times more than an electron, and 10 million times more than an even tinier particle, a neutrino (almost pure energy).

In the 1960s, Utah and New Mexico were the last states to let the first Americans vote.

1964 How we think: Nathaniel Branden, an objectivist. All knowledge & all concepts have a hierarchal structure, based on more basic concepts, & ultimately on one’s sensory perceptions. Only when one knows something is certain can one determine what is not certain, & only logic can separate the two. If one uses a concept, one must be aware of & must not deny or contradict the more basic concepts it is based on. To do so is the Fallacy of the Stolen Concept. (p. 190)

1964-65 Arno Penzias & Robert Wilson at Bell Labs detected cosmic microwave background radiation (“CMB”). In 1965 they realized it was a remnant of the Big Bang. Such CMB had been predicted in 1948 by Gamow, Alpher, & Herman.

Thus there were three bases for accepting the Big Bang. Hubble’s law. CMB radiation from the Big Bang, & calculating galaxies’ speed backward = the age of the oldest stars, c13 billion years. So now Set to Big Bang. (decided 1992)

1966 The 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. The Index was quietly abandoned in 1978, but Cardinal Ratzinger said in 1985 that it still retained moral value “for the more Unprepared faithful.” It had greatly retarded scholarship for Catholics.

1966 Philosophy: Jacques Derrida (1930-2004). French, a poststructuralist thinker, posited the concept of deconstruction, a method of criticism of philosophical and other works which attempts to expose the hierarchies and paradoxes underlying such works. Whenever language expresses an idea, it changes it. Reality is relationships rather than things.

1968 Physics: Steven Weinberg, MIT, said that the weak interaction/weak nuclear force and the electromagnetic force were essentially 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. Weinberg, Sheldon Glashow, and Abdus Salam shared the 1979 physics Nobel prize for the set of equations establishing this idea. This cut the four fundamental forces to three.

Predictions made on the basis of his theory proved accurate, and it is now generally accepted. The search for the “theory of everything” continued. There are several hypotheses seeking to unify the now three fundamental forces.

1968 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, perfect, present, provident, supreme, true, & inexplicably, incomprehensible. This defines the Catholic “perfect” God.

1969 Paleontology, biology: A meteorite over 4.5 billion years old was found in Australia which contained 74 different amino acids, eight of which are involved in making Earthly proteins. An American walked on the Moon.

1970s Astronomy, dark matter: Vera Rubin, American astronomer, saw that the Andromeda galaxy and 60 other spiral galaxies were rotating faster than their visible (thus presumed) mass could gravitationally keep them together. So she inferred that there was some invisible matter with gravitational force in such galaxies keeping them from flying apart due to centrifugal force (what Zwicky (ref.1933) called dark matter). She calculated the presumed gravitational force (attraction) of the galaxies she studied based on their luminosity and the Newtonian calculation for gravity.

1972 Stephen Jay Gould & Niles Eldredge coined the phrase punctuated equilibrium, to describe that evolutionary changes in species was rare & that no-change for long periods, even with huge climate changes, was the norm.

1973 Edward Tryon: The universe may be a random quantum fluctuation in a vacuum, so could have started from nothing. Quantum cosmology has various hypotheses that allow for the universe to have begun from nothing for no reason.

1973 Brandon Carter posited the Anthropic Principle a/k/a Argument from Fine Tuning, a variant of the Design Argument for a God, in light of increased knowledge of matter & of the universe. Carter defined the two forms of the Anthropic Principle, a “weak” form (“WAP”) that dealt with our planet, & a “strong” form (“SAP”) dealing with the fundamental constants of physics, the molecular level. This argument says that all the universal constants & seemingly incredible coincidences & unlikely enabling conditions for life to exist on Earth infer that only a divine power could have caused them & such power did so in order to produce Man (hence “anthropic.”). (ref. Dickie 1961 for its first iteration.).
The Anthropic Principle thus accepts Darwinian evolution & puts the creator one step back; he just set the proper constants & then let the universe begin & evolve according to the natural laws he devised, like deism. It thus denies Christianity, Islam, & Judaism, & all religious miracles, as miracles assume divine intervention.

1973 WAP, the planetary part of the argument, says life on Earth exists only as Earth has the following 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 & 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 in what can be called a Goldilocks Zone (as in, not too hot, not too cold, but just right. Mars is too cold, Venus too hot). Earth's orbit is in a Goldilocks Zone & is so close to circular it doesn’t go beyond the Goldilocks Zone. All these seven conditions are in their own Goldilocks zones.

SAP, the molecular part of the argument, says, there are six fundamental constants of physics that have to be within certain narrow parameters for life to exist. Such as 1. the magnitude of the strong nuclear force (the force that binds the components of an atomic nucleus), & 2. the gravitational attraction between protons in 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 the chemical periodic table from the original hydrogen. And other “constants.” And, were the carbon “resonance” 4% lower, carbon wouldn’t form in first place.

Ridley 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.

Several independent arguments severely weaken (if not simply refute) the Anthropic Principle.

Contra: Would a perfect God create a universe this way?

1. Illogical: The Argument essentially says that c13.8 billion years ago, a supernatural entity created the universe so immense that our most powerful visual telescopes, & even the more powerful radio telescopes, can’t detect more than a tiny fraction of it, with hundreds of billions of galaxies, one medium size galaxy, our Milky Way, holds our Sun, one of hundreds of billions of suns and 100 billion planets, just in the Milky Way, which itself formed billions of years after the Big Bang. Then, c4.6 billion years ago the Earth formed, smaller than a dot in our tiny solar system, which a billion years later produced a one celled organism, that for 3 billion years was the only life on Earth, which, a billion years later, produced hominids, who for seven million years lived, as Hobbes said, with “no arts, no letters, no society; and which is worst of all, in continual fear and danger of violent death, and the life of Man, “solitary, poor, nasty, brutish, and short,” in fear, disease, privation, and ignorance, who c200,000 years ago evolved into Homo sapiens.

That’s a long cruel & inefficient way for an omnipotent God to go just to produce Man. Recall Mill, “If God is omnipotent, he could have created the universe & Man in his present form, [maybe in a better form] in an instant.”

2. Unproven assumption: The Anthropic Argument assumes that carbon-based life is the only possible form of life, an unproven assumption. Pasteur found organisms that live without oxygen. Bacteria live two miles underwater living off the radioactive decay of nearby rocks. Bacteria live in 12,000 year old ice deep in Greenland and Antarctica. Plants and animals live in the Atlantic far deeper than the Sun reaches and exist on bacteria fueled by hydrogen sulfide. Complex communities of microbes live in the superheated acidic water in the Dalol crater in Ethiopia. Microbes have been found that eat and breathe electricity. Multi-celled creatures named tardigrades have been exposed to the vacuum in space and lived. They can withstand temperatures as low as just above absolute zero and pressures exceeding the deepest ocean trenches and deadly levels of radiation.

Assumes carbon based life

3. The argument has all the defects of the Design Argument, i.e., who designed the creator, who designed the creator’s designer, ad infinitum, 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 purpose or value system, if any, not falsifiable, illogical, as shown above in 1, etc. Simone de Beauvoir, 1966, “It is easier to think of a world without a creator, than a creator loaded with all the contradictions of the world.”

John Earman

4. Philosophers 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) 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. Plus that the SAP is simply gratuitous speculation.

5. Certain claimed “fine tuned” constants aren’t constants, Boltzman’s constant, Newton’s gravitational constant, and Planck’s constant are merely conversion factors.

6. Victor J Stenger has persuasively argued that the “constants” don’t have to be so finely tuned. And life evolved
1973 by *Natural Selection* where physics determines what kind of life survives and reproduces, i.e., all life, from bacteria to elephants, adapts to physics, and not physics being adapted for life as the *Anthropic Principle* contends. “Our universe is not fine tuned for us. We are fine tuned [by natural selection] for our universe.” He also posits that a multiverse answers the *Anthropic Principle*. His book *The Fallacy of Fine Tuning* has more technical arguments.

7. The SAP is not testable or falsifiable, and thus not a scientific statement, but simply a philosophical one.

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 far more intelligent than the things he was designing, i.e., far more improbable. Plus, that any one of the popular modern gods, Catholic, Lutheran, Jewish, Muslim, Pentecostal, etc., etc., is the one true God, would be yet even more improbable.

Richard Dawkins

9. Atheist Richard Dawkins & all cosmologists agree that a natural explanation is extremely improbable but possible. Dawkins answered both the planetary & molecular aspects. First, on the planetary level, he distinguished between the origin of life from non-living matter, *abiogenesis*, & the evolution & development of species once life has occurred. These are two completely different phenomena. Random gene mutations such as mistakes in the natural copying of a DNA sequence & *Natural Selection* fully explain the development / evolution of species once life itself exists. So, in the planetary part of the *Argument*, the problem is only the origin of living matter, *abiogenesis*.

Dawkins’s argument is a statistical probability argument. Namely, life only has to originate once by natural means, somewhere, to prove its validity. What are the chances? Most planets are not in a Goldilocks Zone. However, Carl Sagan estimates there are c100 trillion stars/suns. If this is even remotely accurate, then factor in the odds of any such sun having a planet in the Goldilocks Zone and the odds of an eucaryotic cell evolving.

If the chances of life occurring spontaneously somewhere on such planet are a *trillion to one against*, then the chances are that life will occur on around 100 trillion solar systems. Thus the odds are that somewhere, here, for example, life will occur spontaneously. *Any and all such odds are rank speculation*, of course, but the starting number of stars and planets is so incredibly immense that using virtually any odds still favors life originating *somewhere, like here*. There are other theories of the creation of life from inorganic matter, none as yet conclusive.

Theodicies: Alvin Plantinga, an American Christian theologian, argued the *free will defense* to the *Problem of Evil*, positing that “libertarian” i.e., unlimited, free will is of such great morally significant value that it outweighs any evil or suffering it permits, that the price for moral good in the world was moral evil. Also that at a deep level science and theistic religion don’t conflict. Mackie in 1955 had argued that an omnipotent God should be able to create men with free will but moral so they wouldn’t do evil, Plantinga argued it’s possible such a God couldn’t create such good men. He also argued that it’s possible such a God wanted a world with some evil if moral goodness required free moral humans. To meet the argument that the free will defense only applied to human evils, Plantinga argued that it’s possible a mighty nonhuman spirit like Satan or Adam’s *Original Sin* caused natural evils, diseases, floods.

Plantinga’s argument doesn’t prove God, it only attempts to undermine the *Problem of Evil*. It doesn’t offer a positive reason of why such a God allows evil & suffering. Plantinga said that supposed conflicts between science and religion are due to science’s methodological naturalism (It’s science’s fault). Plantinga’s defense of the *free will defense* raises certain contradictions, such as does Man have free will in Heaven, & does God have free will as He cannot do harm. Hume refuted the *free will defense* 1751. There are more refutations than Hume’s, i.e., The *free will defense* has to allow for the possibility that every human will do evil at every opportunity. God OKs this?

Chaos theory: James Yorke and Robert May mathematicians, developing 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 ones. But even the chaos showed repeated patterns.

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. This standard model is meant to explain various physical phenomena. It is not fixed, as further advances in particle physics may find more particles. When formulated in the 1970s, not all 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. (See 2014).

Fundamental to the current Standard Model is the idea that the basic building blocks of the universe are *fields*, not particles (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 and requires that particle masses, charges, and other properties be measured experimentally in order to be substituted into the equations. Hawkins proved that black holes weren’t black, that they would eventually (in billions of years) evaporate.

Edward O Wilson

Sociobiology: Edward O Wilson’s (1929-2013), *The New Synthesis* founded sociobiology / evolutionary biology (the study of the biological basis for all forms of social behavior in all organisms, including Man.) It modified “survival of the fittest;” and used ethology, ecology, & genetics to derive general principles concerning the biological properties of entire societies. All animal and human behavior is the product of heredity, environmental stimuli, and experience.
Man and all of his works were the products of deep patterns of behavior genetically wired, from ants to Man.

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. The study of evolutionary biology grew and posited 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. He argued that evolution meant progress

Sociobiology revived Social Darwinism. It presented evolution as the ultimate theory, the convergence of all knowledge. This rejects Locke's concept of the mind as a tabula rasa & echoes Kant's theory that the mind possesses inherent characteristics enabling it to understand things. It also echoes Francis Bacon's "idols of the mind" (ref.1624). Marx had said social class determined a man's destiny. Freud had said it was anatomy, the Oedipal drama within the family.

In 1927, Einstein had said, "He [God] does not play dice [with the universe]" referring to the uncertainty principle. Stephen Hawking (1942- ), theoretical cosmologist, retired Lucasian professor of Math at Cambridge [Newton's position], responded, "Not only does God play dice, he sometime throws them where they cannot be seen."

1975 Noam Chomsky (1928-) The similarities among languages are too close to be coincidence. So there's an innate universal grammar (subject-verb-object, etc.) enabling children to learn language.

Paul Feyerabend, in Against Method and Science in a Free Society, said that as there are no methodological rules always used by scientists, that limiting activities of scientists to any single prescriptive method would restrict scientific progress. To insist that a new theory be consistent with an older theory gave an unwarranted advantage to the old theory. He also said the Church in 1632 was more faithful to reason than Galileo. Cardinal Ratzinger quoted this.

1975 Carl Sagan estimated that the universe has at least 100 trillion trillion stars. Our Milky Way galaxy contains 200-400 billion stars and there are perhaps 100 to 500 billion other galaxies, many larger than our Milky Way. Estimates vary. Light from the Andromeda Galaxy, the closest galaxy to our Milky Way (with an estimated trillion stars) left the galaxy c2.5M years ago. The Andromeda Galaxy approaches the Milky Way at speeds estimated at 62 to 87 mps.

1975 The Abell 2029 Galaxy is 6 times the size of the Milky Way, with c100 trillion stars. Some galaxies are many billion light years away. Pluto (now termed a dwarf planet as it's only .002 the size of Earth) and the farthest from our Sun, has an orbit of 247.92 years. Coming closer in, Neptune 164.8 years, Uranus 54.02 years, Saturn 29.4 years, Jupiter 11.86 years, Mars 1.88 years, Earth one year/365.2422 days, Venus c224 days, Mercury c88 days.

1975 Our Sun, as stars go, is not particularly large, but is 1.3 million times larger than the Earth and comprises 99.866% of the known mass of our solar system. To scale, if our Sun were one yard across, 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. Our Sun is c27,000 light years from the "center" of the Milky Way. One light year is 5.88 trillion miles. The distance of the Earth to the Sun of c93M miles is known as an Astronomical Unit "AU". The Earth orbits the Sun at c67,000 mph (relative to the Sun). The star Antares itself has a diameter of 363M miles, two times larger than the diameter of the orbit of Earth around the Sun. The closest star to our star/Sun, Alpha Centauri, in our Milky Way galaxy, is 26 trillion miles (27, 200 light years) away. 4.5 light years. So, proportionately, Earth is smaller than a speck of dust floating somewhere in the Grand Canyon.

1978 A divine revelation told the Mormon president it was now OK for Blacks (but not women or homosexuals) to become Mormon priests. By coincidence, Africa was a fertile area to proselytize. Mormons have a Disciplinary Court that disciplines members for "heretical" writings or actions. The maximum penalty is excommunication, not the stake.

1979 The traditional Problem of Evil is that it is logically impossible for the proposed Abrahamic God to exist. William Rowe, among others, proposed what is known as "the evidential or probabilistic Problem of Evil" where natural evils and suffering are seen as gratuitous in the world & are thus evidence against the probability of the existence of the Abrahamic God, not its logical impossibility. (Being informed of an error, he revised his argument in 1999.)

1979 Cosmological Argument: Christian theologian William L Craig's The Kalam Cosmological Argument argued that, everything that exists had an ultimate first cause, and, as an actual infinite regress is impossible, the universe began to exist some time, and that the efficient cause of the universe must have something beyond nature, namely the Abrahamic God. This argument was first formulated by the Mutakalimu, Muslim scholars of the 9th century.

Quentin Smith, an atheist, in 1984 replied that quantum mechanics says that the universe could have begun without a cause. Smith also argued in 1987 that the Kalam Argument does not preclude the possibility of an infinite past.

Other cosmologists have also disputed the argument that the universe needed a cause.

Peter Singer, a utilitarian philosopher, ethicist, If one can do great good, one must. Give to charity, save lives. The dynamics of the free market in the US & Europe increased the inequality of wealth. Europe became more secular.
1982  **Mackie** (ref.1955) argued that **Plantinga’s** 1974 argument re the **Problem of Evil** only gave a possible reason why a God might permit evil & suffering, but no evidence for it or why such reason was plausible or universal.

1983  Astronomy, dark matter: **Mordechai Milgrom**, Israeli, proposed an alternative to the theory of dark matter. He simply proposed that using a different calculation for gravity would eliminate the need for the then (& still) inferred but unfound and not-understood concept of dark matter. **Milgrom** argued that dark matter couldn’t be found as it didn’t exist. **Einstein**’s general relativity agrees with **Newton**’s gravity where gravity is relativity strong but predicts differently in extreme environments such as near black holes. **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, but dark matter is still the majority view. If so, most of the cosmos is unknown.

1983  **Hawking** (ref.1975) & **James Hartle**: The universe has no known physical boundaries. **Hawking** & other cosmologists said that there is a law of nature called the **Wave Function** of the universe that implied that there is a 95% probability that our universe came into existence without a cause. [At least a cause they could comprehend] The **Big Bang** model was modified to include an incredibly huge expansion in the first instant of the Bang, inflationary cosmology.

In the 1980s at least 60 different kinds of subatomic particles’ existence were confirmed. **Hawking**, “In theoretical physics, the search for logical self-consistency theory always comes first, which makes further predictions. If proven wrong, discard it.

**Philosophy**: **John Beversluis** wrote **C S Lewis** and the **Search for Rational Religion** to refute Lewis’s 1947 book **Miracles, a Preliminary Study**. **Beversluis** first critiqued Lewis’s **Argument from Desire**, briefly stated is that humans have an innate desire for joy beyond the natural world. And God fulfills that need. **Beversluis** first disputed the premise, stating that there was no evidence that such desire was a cultural universal. Then 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.

Next **Beversluis** disputed Lewis’s **Argument from Morality**, that all people know right from wrong, which could only come from God. **Beversluis** said Lewis only answered straw man arguments and not the strong refutations by **Hume** and **Hobbes**. **Beversluis** then disputed Lewis’s **Argument from Reason** which stated that naturalism was incompatible with reason. **Beversluis** agreed with Keith Parson’s refutation that Lewis meant that if naturalism were true that there was no such thing as valid reasoning. This was false.

**Beversluis** refuted Lewis’s **Jesus** trilemma, which stated that Jesus claimed to be God & the only alternatives were that he was God, a lunatic, or a liar. **Beversluis** said that because of the unreliability of the Bible, there was no certainty as to what Jesus actually did claim. And in any case if Jesus did so claim, there was an obvious other choice, Jesus was simply mistaken. Many people have wrong beliefs, even weird beliefs without being insane.

1987  **Physicists** proposed **Loop quantum gravity** to reconcile relativity and quantum mechanics. They are not reconciled.

1987  **Anton Szandor LaVey**, author of the **Satanic Bible**, on his job as head of the First Church of Satan, “It’s a living.”

1987  **U S Supreme Court**: A state law requiring teaching Creationism as science was unconstitutional. **Scalia & Rehnquist** dissented. In response, in 1989, creationists concocted the concept of Intelligent Design, a crude rewrite of the theistic **Design Argument** without explicitly saying the designer is a god. They urged schools to “teach the controversy.”

**Cosmology**: **Hawking**: 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.

1988  **Catholicism, Rational arguments for God abandoned**: Pope **John Paul 2 / Karol Joseph Wojtyla**, Polish, abandoned rational arguments for God. He said, “Christianity possesses the source of its justification within itself and does not expect science to constitute its primary apologetic.” Similarly, Calvinist theologian **Robert Reymond’s Justification of Knowledge** (ref.1984) had said believers should not try to prove God exists by arguments but should accept the content of revelation by faith. Rational arguments for the Abrahamic God had, however, long been refuted rationally.

Bishop of Rome / Pope **Gregory the Great** (ref. 591) had long previously admitted the superiority of the truths of reason over truths based on faith when he said, “Faith has no merit where human reason supplies proof.” No one doubts but that if scientists had found actual proof of God, theologians would have embraced it fervently.

**Tim Berners-Lee** almost single-handedly invented the World-wide Web, greatly assisting scientific research.

1989  **Ayatollah Khomeini**, spiritual leader of Iran, issued a fatwa (an order of execution) against **Salmon Rushdie**, who had written an anecdote in his book, The Satanic Verses, disputing a part of the Koran involving **Muhammad**.

1992  **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. Strong radio telescopes can detect it and is almost the same strength from all directions in the universe, and not associated with any star or galaxy. It is strong evidence of the Big Bang model of the universe. Stephen Hawking called it “the discovery of the century, if not of all time.” The Big Bang is now thought to be c13.8B years ago. So, Match to Big Bang.

John Paul 2 said Vatican’s errors re Galileo was to think geocentrism was imposed by the Bible. Actually, it was. He also acquitted Galileo, but not Bruno or the tens of thousands of other victims of the Inquisitions.

1993 Theology: Plantinga (ref.1974), in Warrant and Proper Function, posited an argument for God he called Reformed epistemology, that God can be rationally believed in without arguments or evidence.

1996 Catholicism, Evolution: Pope John Paul 2 (ref 1988,1992) admitted that evolution was “an effectively proven fact but there came a time in the evolution of...humans, which science could not identify, and which was solely within religion’s domain when God put a soul in a previously animal [primate-hominid-Homo sapiens] lineage.” John Paul 2 said that Catholics could not accept any theory of evolution which denied this “ensoulement” concept or denied that Man “was created in the image and likeness of God.” That is, God intervened in evolution. It’s a major step for Catholics, but it isn’t Darwinism. See at 2000 for John Paul’s apologies for the Church’s sins against humans.

1997 Biology: Paleontologist Stephen Jay Gould argued that evolution by Natural Selection is not linear progressing toward more complex and more intelligent organisms like Man, but is simply adoptions to changing local conditions through random genetic mutations and natural selection. Though Man has progressed culturally, physical evolution does not imply physical progress. Of uncharacteristic dubious credibility, Gould argued that religion and science do not conflict as they inhabit different non-overlapping magisteria. This fails as religions make many statements in science’s magisteria, i.e., scientific matters, like disease, miracles, comets, lightning, Jesus’ virgin birth (Jesus had a human father or he didn’t). Earth was created c6000 years ago, or not. God parted the Red Sea, or He didn’t.

1990s Skeptical Theism emerged in the 1990s to finesse the Problem of Evil, namely, one must be skeptical of one’s ability to discern why God caused or permitted apparent evils; as apparent evils, in the big picture known only to God, may not be an actual evil. This is a new formulation for Leibniz’s 1710 theodicy that what humans perceive as an evil is only an evil according to Man’s “narrow human perspective.” Calvin also had made the same argument.

Skeptical Theism suffers from all the arguments refuting Leibniz’s argument. (ref. Hume 1751). The most persuasive of refutations is that if Man’s intellect is so limited, he couldn’t engage in any authoritative moral deliberation or have moral knowledge in the first place. Plus, many evils and sufferings are just too horrific to be justifiable by any measure, the holocaust, downing the WTC, earthquakes in Haiti and Lisbon, Pol Pot, tsunamis in Asia and Galveston, Tambora, Pompeii. As previously noted, if God has OK’d all these evils, what won’t He OK?

1998 Pope John Paul 2 issued Fides et Ratio / Faith and Reason. Both are needed, as per Augustine. Faith without reason “runs the risk of withering into myth or superstition.” Reason without faith can’t reach the ultimate truths of existence.

1998 Islam: Taslima Naslin, Bangladeshi doctor, described her departure from Islam. “When I studied the Koran...I found many unreasonable ideas. Women were treated as slaves, just sexual objects.” She saw religious intolerance and oppression increasing, especially in Muslim countries, and especially against women. Islam doesn’t permit democracy.

1998 Astronomy: Astrophysicists determined that over just the past 5 billion years, the universe was expanding faster than the perceived 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. So they inferred that some unknown undetectable factor with anti-gravitational properties was causing such acceleration. They called it dark energy. As it acts contrary to gravity, it was presumed to have no mass.

Dark Matter: The biggest questions then facing cosmologists (apart from the origin of the universe) were not a presumed type of invisible gravitational force but a presumed type of energy counteracting gravity & causing the universe’s unexplained rate of expansion. Dark matter and dark energy are still the prevailing theories despite good evidence for MOND. Michael Schermer, “Dark matter & dark energy are linguistic placeholders until we figure out what causes unsolved mysteries of [galaxial movements].” New Agers treat paranormal, supernatural, and miracles as real explanations. Astrophysicists also determined that space, considered empty, contained 10-29 grams of matter/cubic centimeter.

Papal apologies

apology had been formulated in the Vatican for months. Bishop Piero Marini, the Vatican spokesman, said, “Given the number of sins committed over the course of 20 centuries, it must necessarily be rather summary.” During his reign, John Paul apologized for the Church’s denigration of women, priestly sex abuses, its treatment of Galileo, African slaves, Jan Hus, Christians in Constantinople during the 1204 Crusader attack, & mistreatment of ethnic groups (for showing contempt for their cultures and religious traditions), and those burnt at the stake during the wars of religion.

Later in 2000, John Paul’s Dominus Jesus said that Roman Catholicism is the one, true Church of Jesus Christ, the one path to salvation.” Cardinal Ratzinger (later Pope Benedict 16 2008-2013) said this was a necessary response to the theology of religious pluralism. i.e., accepting that one’s religion is not the exclusive path to salvation.

2000 Theology: J P Moreland articulated the Argument from Consciousness (originated by Arthur Balfour in 1914). “How did evolution convert the water of biological tissue into the wine of consciousness? Materialism does not provide an answer. Only theism provides an answer,” thus God exists. A clever question, of common sense plausibility. But it assumes consciousness is strictly a physical phenomenon, i.e., a hard-wired attribute of the mind. The mind may of course be. Stephen Conifer says that there are in fact several alternatives to theism that posit answers to how consciousness evolved, namely deism, pantheism, various Eastern “religions”, & of course, science. Edward O Wilson (ref.1975) predicted in 2014 that neuroscientists would soon identify the physical basis of consciousness. Some of the more intelligent animals like whales, dolphins, & chimps behave as if they had human traits like consciousness, bonding, cooperation, mutual aid, mourning the dead.

But consciousness does not have to be hard wired. It can be learned. Consciousness evolved. (Gould). As humans evolved, they learned facts & ideas, attitudes, experience by experience, generation by generation, learning from philosophers. They developed social & moral codes over eons & taught a sense of self we call consciousness. Nicholas Humphrey says that consciousness evolved because humans enjoyed being conscious. Moreland’s argument, like the Design Argument does not lead to or validate any particular religion or deity or value system.

What drives/inspires men? Man have always tried to find a meaning to their lives. Scientists have sought meaning by seeking to understand the laws of nature. Men have also sought meaning to their lives in learning, in philosophy, in a religion, a nation, their family, tribe, or job, in an ideology, a cause, & even in a sports team. Chris Hedges, “God is the name we give to our belief that life has meaning, one that transcends the world’s chaos, randomness, & cruelty.”

Wilson (1975) also noted that certain societal benefits come from religions’ moral codes like those that instruct their members to relieve suffering and care for the vulnerable.

2001 Paleontology: the fossil of an animal between fish (gills, scales, fin) & tetrapod (4 legs, lungs, flexible neck, sturdy skeleton) dating to 375M BC was found in N Canada. More fossils with fish & tetrapod features have been found.

Problem of Evil Billy Graham, . America’s most prominent evangelical was asked why God permitted the evil slaughter of 3000 persons by Muslims on 9/11. After 2,000 years of theologians seeking a suitable answer to the Problem of Evil, he said that he didn’t know, He didn’t try to justify evil or blame dumb humans. Two fundamentalist Christian preachers, however, did know (i.e., they solved the Problem of Evil). On TV, Jerry Falwell said that pagans, abortionists, feminists, gays, the ACLU, and lesbians who were trying to secularize America helped this happen because, “God will not be mocked.” Pat Robertson, the host of the TV program, said, “I totally concur.”

2004 Dark Matter The Andromeda Galaxy was estimated to have a trillion stars/suns, twice as many as the Milky Way. Andromeda and the Milky Way are moving toward each other faster than would be accounted for by their visible apparent masses. Astronomers posit that there must be invisible dark matter within both galaxies gravitationally attracting them, based on the math of Newtonian gravity. Cosmologists speculate that dark matter is sub-atomic particles.

2005 Judge John Jones barred teaching Intelligent Design as science in public schools. Called it “breathtaking inanity.” Public schools may teach creationism in a course on religious beliefs or philosophies or myths, but not as science.

2006 Christoph Cardinal Schoenborn, Archbishop of Vienna, a close associate of Benedict 16, wrote in the NY Times that there was overwhelming evidence for purpose & design in modern science. & Darwinian evolution was not true.

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. are ultimately obedient to the laws of physics and chemistry, and. 2. have arisen by evolution through natural selection.

Dark Energy Assuming dark energy & dark matter exist (contrary to Milgrom), the total mass-energy of the universe is now said to be c4.6% ordinary matter-energy, c24% dark matter, & c71.4% dark energy (also an assumed form of energy).

2008 Bart Ehrman’s God’s Problem: How the Bible Fails to Answer our most Important Question-Why We Suffer describes several biblical answers to the Problem of Evil. 1. In the Torah, God punished Jews for infidelity. 2. Job; we suffer to test our faith. 3. Evil is due to Man’s sinful free will. 4. Paul: suffering is redemptive. 5. A malevolent force creates
disasters, from which God will save us when he returns. Ehrman concluded these are incompatible & riddled with refutations. Ecclesiastes gives the existential solution; i.e., there is no answer; so live fully while you can.

2009 Cosmological hypotheses: People once thought that the mere existence of matter proved that a God created the universe. Many still do. Einstein showed that matter & 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 & the negative energy of gravity, so no energy was required to produce the universe. The universe could have come from nothing.

2009 Dogma vs. reason: Chris Mooney and Sheril Kirshenbaum’s Unscientific America showed that the single best predictor of scientific literacy in a nation was the absence of the nation’s domination by religion of any sort.

2009 Cosmology: Frank Wilczek, 2004 Nobel, said that a universe of “nothing” is unstable, a vacuum would undergo a spontaneous phase transition into something more stable, like a universe containing matter. Also that the most significant event of the 20th century was discovering the laws of matter itself, its particles, relativity, quantum physics.

2010 Stephen Hawking & Leonard Mlodinow’s Grand Design posited M-theory, a version of string theory, as the best candidate for a complete theory of the universe. “Spontaneous creation is the reason there is something rather than nothing, why the universe exists, why we exist. It is not necessary to invoke God to set the universe going.”

2010 Epistemology: Marcelo Gleiser, astrophysicist re 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. Each era will describe the cosmos [in new ways.] that may be radically different from the preceding one.

2011 Free speech?: The Pew Center said nearly half of countries have criminal laws against blasphemy, apostasy, or defamation of religion. Over 55% of US universities have speech codes that prohibit Constitutionally protected speech.

2011 How we think: J Anderson Thomson and Clare Aukfor’s, Why We Believe, A Concise Guide to the Science of Faith, argues that physical characteristics of the brain have caused it to be receptive to belief in a god(s). Belief can be more compelling than reasoning. It’s also much easier. The advertising industry is based on such premise. Luther Burbank; “The greatest torture for most people is to think.” Religions benefit from brain features like its susceptibility to ritual, repetition, brain chemistry, trance states, a propensity to follow a father figure, a predisposition to ascribe a human cause for events (Psychologist Deborah Kelemen says children tend to think that things happen for a purpose.) and a dozen other psychological predispositions for faith, to induce feelings of security & reverence. The book argues how people still believe after 150 years of analyses & studies refuting nonsense in scriptures. The book’s premise is that God is man-made. It focuses on Christianity.

Other considerations for belief: We believe because 1. most importantly, that’s how we were brought up. 2 we fear death. 3. we had a religious experience 4. we have a need for a meaning to life.

If Man knows nothing else, he could well believe/know that the Sun travels in a chariot from one side of the world to the other every day, & that the priest telling him that has magical power & thus must be obeyed. Modern believers scoff at such ancient myths yet accept supernatural claims about the world in their holy scriptures. Belief in the supernatural is belief in the supernatural. “One miracle is just as easy to believe as another.” William Jennings Bryan. Ingersoll “The naked savage, worshiping a wooden god is the religious equal of the robed pope kneeling before an image of the Virgin.” Islam, Judaism, and Christianity are particularly concerned about sexual practices. A recent 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.

2012 Cosmology: Lawrence Krauss’s A Universe from Nothing, Why There is Something Rather than Nothing, links quantum physics to Einstein’s theory of relativity, & says (like Wilczek) “nothing” is unstable. 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 timescales too small to notice. If one applies quantum mechanics to gravity, not only can a universe spontaneously appear from nothing, it must.

2012 A revolutionary gene splicing technology, CRISPR let scientists edit nearly any gene quickly & precisely.

2013 How we think: Douglas Hofstadter and Emmanuel Sander, “All thinking, from the superficial to the most profound, is based on analogy.” Einstein’s insights were the elaborate creation of abstract analogies. He was an exemplar for thinking with analogies. But, there are good analogies & bad analogies. They mislead when matters are dissimilar. They caution that most analogies are false as they usually compare dissimilar matters.

2013 Pope Francis, the first Jesuit pope, criticized the excesses in capitalism as the “dung of the devil.” Said, “Today everything comes under the laws of competition and the survival of the fittest where the powerful feed on the powerless.” Capitalism is “idolatrous, which needs to sacrifice human lives on the altar of money and profit.”
Regarding homosexual priests, Francis said, “Who am I to judge? A compassionate statement. Pope Benedict 16 had called homosexuality a “moral evil.” Francis’s attitude of decency and reasonableness undermined 2000 years of Christian arrogance as the harsh judge of human sexual behavior. Francis also said that the Big Bang theory actually required a divine creator, and that God was not able to do everything, i.e., God is not omnipotent.

*The Cambridge History of Capitalism* and *Sven Beckert’s The Empire of Cotton* both named slavery as the most important engine of capitalism and economic development and growth in the 18th and 19th centuries.

Shanto Lyengar & Sean Westwood: Prejudice based on political ideology is greater than racial or gender prejudice.

*How we think.* Man’s thinking is impaired by many influences, the internal limitations of the mind and the external pressures of society (or a combination). See also *Thinking / thought* in the *Index and Glossary*

Some *Internal* influences on men’s thinking: Voltaire: “It is hard to free fools from chains they revere.”
Roger Bacon: (1268) named four “stumbling blocks” to clear thinking, 1. Weak and unworthy authority, 2. feeling of the uninstructed crowd, 3. Long custom, and 4. Hiding of one’s ignorance in a display of apparent knowledge.
Francis Bacon: (1624) 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*, loose language, the tyranny of words, and 4. *Idols of the theater*, prejudices, from received philosophical or religious systems.
Michel de Montaigne: (1580), “Nothing is so firmly believed as what is least known.”
Dostoyevsky: (1880) “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.”
David Hume: (1739) “Reason is and ought only to be a slave to our passions.”
Festinger: (1957) described how tenaciously we defend our beliefs (even fallaciously) against refuting evidence.
Murray Gell-Mann: “Rationality is only one of many factors governing human behavior.”
Schopenhauer: “Men don’t think, only believe.” [& so “think” slogans, prejudices, proverbs, sayings, aphorisms]
Edward O Wilson (1975) & Thomson & Auktor (2011) described how belief is so much easier than thinking.
Studies of the brain have shown the importance of fear in the thinking and memory of persons.
Michael Shermer’s *The Believing Brain* (2011) posits that the brain finds patterns to phenomena and then infuses them with meanings that shape its understanding of reality, belief-dependent reality, ignoring contrary evidence
Hofstadter & Sander: (2012) All thinking is based on analogies, but most analogies mislead as of dissimilar things.
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.
Robert Sapolsky: “Unconscious forces” cause voters to vote for more “competent looking, better looking” candidates.

*External* influences: Most overt societal pressures hindering clear thinking have come from organized religions.

All belief systems affect their believers’ thinking: belief in a god(s) of any sort, atheism, devil worship, witchcraft, the occult, beliefs of racial or ethnic superiority or inferiority, cargo cult, paganism, fetishism, naturalism, scientism, shamanism, ancestor worship, polytheistic religions, pantheism, Chinese metaphysical beliefs, pseudo-religions, astrology, numerology, alchemy, plus feelings of superiority or inferiority, mental disease, etc., etc.
Tertullian, It isn’t necessary for Man to think as God has done it for them....Philosophy is the work of demons.
Blaise Pascal, (1654). " 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 so many men Christians."
H G Wells, (1902)“There was a great struggle to establish [science] against the prejudices of those for whom the Bible was the literal truth.
Mark Twain, “When even the brightest mind in our world has been trained up from childhood in a superstition of any
External influences on thinking

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.”

Afghani criticized the Muslim scholars who read the old texts but did not understand electricity or a steam engine. “How can these people call themselves sages?” The religious person is like an ox yoked to a dogma that stifles science.

Bertrand Russell, “Science...has forced its way step by step against Christianity, against the churches and against the opposition of the old precepts...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.”

Paul Dirac, The honest assertion that God is a mere product of Man’s imagination is branded as the worst mortal sin.

H L Mencken (1925), Religions’s modest services on the ethical side are nothing to the damage...to clear thinking. Atheistic communists ruling Russia, demanded that all science conform to communist ideology.

Loren Eiseley: “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.”

Joseph Campbell (1943) showed The Power of Myth over men.

William E H Lecky, (1865) “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.”

Stephen Jay Gould. “We, in large part, are playing against ourselves. Nature is objective, and nature is knowable, but we can only view her through a glass darkly - & many clouds upon our vision are of our own making: social & cultural biases, psychological preferences, & mental limitations (in universal modes of thought, not just individual stupidity).

Upton Sinclair, “It is difficult to get a man to understand something, when his salary depends upon him not understanding it.”

Thomson & Auktor (2011) Many believe in the supernatural despite of centuries of such forces being debunked.

Lev Vygotsky (1958) We learn to think based on concepts / words we know. He founded cultural-historical psychology. Thought is restructured while it is transformed into speech.

People who want to be offended will find things that offend them. People who believe in miracles will find miracles.

Philosophers and scientists err and differ. The history of philosophy is a continual process of new philosophies.

Lord Acton, “There is no error so monstrous that it fails to find defenders among the ablest men.”

Locke said that the mind at birth is a blank slate. Kant said that the mind at birth has built in abilities. One of these views must be wrong. Both in fact may be wrong. Most (not all) natural philosophers / scientists up until the 18th century, including the greatest scientist, Newton, believed in supernatural forces.

Descartes, “There is nothing so strange or so unbelievable that it has not been said by one philosopher or another.”

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.”

Cicero, “There is nothing so ridiculous but some philosopher has said it.”

Joshua Reynolds, 1776 The study of history ought not 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.

Bad science: Science magazine in 2015 reported that only 36 of 97 published psychologists’ studies dating from 2008 could be replicated, most with lesser effects than originally claimed. In 2012, Nature magazine said 47 of 53 “landmark” cancer studies in the top three journals from “reputable” labs could not be replicated. Bayer labs found similar results. Overall, “scientific” studies that had to be retracted rose tenfold during 2002-2012. (Those whose studies were faulted have challenged the attempted replications.) While scientific studies can be and are verified or falsified, holy scriptures can not be. Scientists can & do challenge scientific theories with new facts, new theories, & the scientific method verifies or improves or debunks them. Science seeks an objective reality independent of the errors of scientists. Science, with its discipline of the scientific method designed to avoid the anti-reason is the best chance at clear thinking

As noted in the first sentence of this history, in primitive times, priests made pronouncements about the natural world which they said came from a god. They lied of course. This worked for millennia and continues to work for many today, but advances in science day by day, every day, debunk “divine” statements about the natural world.

Democracy

Political Theory, Democracy is, in most basic terms, the rule of the people by majority vote. In modern times it includes protecting certain rights of people against the “tyranny of the majority,” as the U.S. Bill of Rights does. Democracy is such a powerful idea that all governments including dictatorships now claim that they are acting in the will of the people. Even with its faults, democracy is the form of government that best permits persons to chose their governors & that best respects individuals, & comes closer toward providing individual freedom. John Dewey, “Democracy & the one, ultimate ethical ideal of humanity are to my mind synonymous.” But, many inequities persist, even in democracies.

Totalitarianism

Totalitarianism is interested only in power & a spurious sense of national honor. All the largest religions tolerate & thus perpetuate inequality in societies. Many countries, even secular European ones, subsidize religions to varying degrees, paying clergy, exempting them from taxes, etc. Churches in return preach obedience to the state as God’s will.
Medieval Theocracy, the rule of God, as enunciated by the Christian & Muslim clergy, was the rule in the Dark & Middle Ages in the West. Devout Christians & Muslims lived & still live in constant terror of unbearable pain in Hell for eternity, a powerful form of social control. This was a very tough act to buck. The basic weakness of any religion as a means of social control is that when its statements about the natural world are proven false it loses credibility. 

Recall, in the beginning, every natural happening was ascribed to a god. The domain of such gods has now shrunk immensely. Science daily provides logical, verifiable explanations for phenomena once claimed to be controlled by god(s). Christian theocracy of the Middle Ages failed, in part as science debunked biblical statements about the natural world (and because of the corruption & incompetence of the clergy). (Ref: Erasmus, Wycliffe, Hus, Luther.)

Modern Theocracy

Theocracy today: Many Islamic countries are theocracies. Theocracies consider most social change heretical, & thus cripple themselves. Democracy, rule of the people, accepts continual change, & thus is incompatible with theocracy. Theocracy, Judeo-Christian, or Muslim, is incompatible with reason and scientific advancement. As previously noted at AD 644, shame and honor play a huge role in Islamic cultures. Islam’s aversion to science (with a very few exceptions) has caused the Arab world to lag far behind the more science-friendly nations. These circumstances have heightened a sense of inferiority and shame among Muslims, leading to behavior (honor killings, protests against cartoonists) nonsensical to educated Westerners.

Equality and Dignity of Man Timeline

Equality and Dignity of Man Timeline

600-300 BC Greece: Solon established democratic institutions, but only for free, city-born, males. Aristotle, Polities which lean toward democracy possess the greatest political stability. Pericles’s Oration to Democracy. All known cultures condoned slavery and considered women as property.

5th cent. BC Confucius taught Man had dignity. The Hebrew Bible sanctioned slavery & the subjugation of women.

100 BC Roman Republic. Citizens, free male landowners, had a Bill of Rights. The Senate was an aristocracy.

AD 1st cent. Christianity added charity & mercy to Jewish dogma, but sanctioned slavery and women as property.

AD 750 The Koran said women were property, sanctioned slavery. Anti-Semitism pervaded Christianity.

1088 U. of Bologna founded, law emphasized, based on rediscovery of a digest of Justinian’s Code.

1215 Magna Carta - Absolute monarchy limited. English king forced to cede some power to barons & earls.

1324 Marsiglio of Padua proposed democracy for civil as well as Church governance. No chance.

1416 Slavery abolished in Dubrovnik 1486 Pico della Mirandola’s Oration on the Dignity of Man

1579 George Buchanan, Scot. All political power belongs ultimately to the people, who elect their leaders.

1638 Scottish National Covenant, Presbyterian democracy. King can’t make laws w/o Parliament’s OK.

1649 Cromwell executed Charles 2. Parliament became the ruler, a representative government of laws.

1683,1696 Pennsylvania’s Frames of Government were models for later Colonial (and other) constitutions.

1689 Locke built on Hobbes’s Social Contract. Authority derives solely from the consent of the governed.

1776 Common Sense, Virginia Declaration of Rights, American Crisis, US Declaration of Independence, “All men are created equal and are endowed by their Creator with [certain] inalienable rights.”

1777 Scottish Court of Sessions freed a slave brought who had been from Jamaica to Scotland, Law Lord Kames stating, “We sit here to enforce right, not to enforce wrong.

1789-1794 French Revolution, Declaration of Rights of Man. The US and French revolutions made democracy the most powerful concept in any discussion of political theory.

1793 Mary Wollstonecraft, in Vindication of the Rights of Women, The Enlightenment’s chauvinism is hypocritical. After her, women’s suffrage was taken seriously.

1800s Slavery was legally abolished in most countries. But segregation & racial discrimination continued.

1830s Abolitionist Movement in America.

1832 Parliamentary reform. King William 4 had agreed to appoint 60 new peers if the lords prevented it.

1848 Seneca Falls Convention for women’s rights. Socialist organizations develop. Communist Manifesto

1800s Colonies around the world gained independence by fighting for it.

1857 US Supreme Court decided slaves were property, Dred Scott decision.

1861 Alexander 2 of Russia freed the serfs. It was largely symbolic as serfs’ actual rights changed little.

1863 Gettysburg Address, Government by, of, & for the people. Most famous phrase in American history.

1865 13th Amendment proposed and ratified. Freed all US slaves. Racial discrimination continued.

1867 Second Parliament reform bill gave the vote to workers. J.S. Mill tried to get vote for women, failed.

1920 Women could vote in the US. In Canada, women in most provinces could vote in 1919.

1928 In Britain, 30 year old women owning property or UK college graduates could vote.

1945+ WW 2 spread the idea of universal suffrage & democracy. United Nations Charter Preamble. “We the Peoples of the United Nations determined...to reaffirm...the dignity and worth of the human person...”


1964+ Civil Rights Act. Lyndon Johnson’s best legacy; appointed Thurgood Marshall to the Supreme Court
What can we know of Contrariety? Can we are not natural world?

Lesser gods: Zeus, god of weather, law, order; Poseidon, god of the sea, floods, droughts; Coesus, god of the intellect; Apollo, god of healing; Lenatos, god of the hunter’s skill; Sophia, goddess of wisdom, etc. All could presumably do great good for Man, but do not. Over history, hundreds of gods around the world have had their day and faded. While the Problem of Evil is solid, there are other problems refuting the Western concept of the Abrahamic God:

Problem of Contrariety / Contradictory Dogmas (Hume) Overriding all belief in any religion is the second basic law of thought, the law of contradiction, two contradictory statements can not both be true. Abraham Lincoln said, “In great contests each party claims to act in accordance with the will of God. At least one must be wrong.” [if not both].

CONCLUSIONS

What can we know? Problems with belief Why torture for God? What do we know?

We can (and do) know a great deal about the natural world. In the incredibly short period of less than 3000 years, Man has progressed from knowing virtually nothing of the world to relativity and quantum electrodynamics. All knowledge of the natural world begins with basic truths that are true by definition, like mathematical calculations and hard facts from hands-on verified experiments, from which logical arguments and experiments lead to a consistent and expanding body of propositions and natural laws that are verified and that all participants agree on. New discoveries and ideas are tested by the scientific method and verified or discarded. Science is a method to understand the world; it is not a fixed set of beliefs. Science assumes there are understandable laws of nature. Science seeks to discover objective reality despite human limitations. To a scientist, unknowns are unsolved problems.

But, there is a way to verify if a god exists. The god can show up. Christians believe their god, Jesus, showed up & said and did certain God-like things. The New Testament is the only record of Jesus’ purported actions. All scriptures describe things purportedly done or said by their gods. The Bible & the Koran are riddled with inconsistencies. So determining what is reliable is logically impossible. If one believes in the supernatural, one can believe anything.

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

All religions are not equal

Many modern Christian theologians preach tolerance of other religions despite the intolerance mandated in various holy scriptures. But the ruling clergy of organized religions know they must insist that their particular scriptures are the true word of God. This insistence unwise takes away the excuse that the humans who actually wrote the holy scriptures at various points of human knowledge reflected now discredited human attitudes. (Bible, “Believe in Jesus or you will go to Hell,” John 12:48, 15:6, Matt. 13, 16:16, & 40-42; 2 Thess. 1, 7-10. Koran, “Unbelievers [non-Muslims] will be burned with fire” 2:39, 90; 2:114, & in over 200 like passages. The Book of Mormon, “Unbelievers will go to Hell.” Mosiah 26:27, & other passages.). Advocates of tolerance ignore their scriptures and diplomatically infer that all religions are equally worthy, i.e., Quakers, Baha’ism or pacifist Jainism are equivalent to militant religions.

Second Coming: For 2000 years, some Christians have believed Jesus’ would return soon, as He promised. Such belief likely caused Christians in Jesus’ time to ignore long term thinking such as the study of science. Belief the world would end at AD 1000 caused great disruptions. A 2010 Pew poll said that 55% of American Christians believe that Jesus will return by 2050. Such belief can affect public policy. For example, refusal to fund actions with long term horizons such as measures to protect the environment or to combat global warming. Influential Congressman John Simkus opposes actions reducing global warming as, “The Earth will end only when God declares it to be over.”

Problem of Evil

What can Man know about the Western proposed omnipotent, loving Abrahamic God? The Oxford Companion to Philosophy says the Problem of Evil is “the most powerful objection to traditional theism.” But, it is not just an objection; it is a refutation. The Problem of Unnecessary or Gratuitous Evil or Suffering established that such an entity can not exist as it would have prevented unnecessary or gratuitous evil & suffering, but has not.

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 criticize 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 & couldn’t be bothered to do it.”

Dawkins, “One can’t absolutely prove that a god doesn’t exist but the absence of any evidence that a god does exist makes a god so unlikely that one can assert with scientific but not absolute certainty that a god does not exist.”

Problem of Contrariety

The logic of the Problem of Evil also invalidates lesser gods with claims to supernatural powers and benevolence: Zeus, god of weather, law, order; Poseidon, god of the sea, floods, droughts; Coeus, god of the intellect; Apollo, god of healing; Lenatos, god of the hunter’s skill; Sophia, goddess of wisdom, etc. All could presumably do great good for Man, but do not. Over history, hundreds of gods around the world have had their day and faded. While the Problem of Evil is solid, there are other problems refuting the Western concept of the Abrahamic God:

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"As all religions are just custom, there is no point in religious intolerance."

Montaigne

Dogmas differ

The Bible & Koran & other ancient religions’ scriptures were written by men who knew little of what we know today. Scriptures are claimed to be inspired by an omniscient God, & thus true in all regards. But the Bible has statements that contradict each other. The four gospels have contradictory descriptions of Jesus' life and resurrection. The dogmas of every religion contradict certain beliefs of every other religion. So, believers of every religion know that every other religion has some false beliefs & is therefore faulty. Hundreds of supernatural belief systems have had their day & are now defunct. The Bible & Koran contain statements about the natural world that science has shown false. Recall the Oxford Declaration, "If any part of the Bible was seen to be in error then the whole of it could be called into doubt.

To salvage the concept of a monotheistic God with the reality of innumerable conflicting belief systems, some theologians say that there are many roads to the one God. This negates every religion’s claim that it is the true road. Sagoyewatha, Seneca Indian 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 religion, why do you white people differ so much about it?

Numerous passages of the Bible have been shown to have been revised over the ages. Augustine excused errors in the Bible saying that it was accommodated to primitive peoples’ understandings. So it required careful interpretation (by priests). Some theologians say that Bible verses have a surface meaning & other meanings.

Many modern theologians ignore errors and contradictions in the Bible in favor of a sociological justification for religions, i.e., that religions give meaning & comfort to people’s lives, which they do in many instances.

Hell & miracles are virtually ignored in modern theology.

Divine Hiddenness

The Problem of Divine Hiddenness. This problem resembles but is broader than the Problem of Evil but without its morally compelling theme. This problem asks, if the proposed Abrahamic God exists, why doesn’t He / it do something Man could see & verify, maybe something God-like, worthy of worship. Richard Dawkins: “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.” Recall, John Paul 2 in 1988 abandoned rational arguments, for God.

Problem of Unanswered Prayers

God done so? Anyone can judge for himself. The largest objectively documented test of Jesus’ promise is the record of the healing shrine at Lourdes which has had over 200 million visitors since 1858 (now about 6 million per year), presumably seeking a miracle cure of some sort. Bishops have “validated” 69 miraculous cures in 157 years, seven the first year, three in the last 50 years. Scientists have investigated and discounted virtually all such “miracle” cures as being of conditions most susceptible to psychosomatic influence or known to show spontaneous remissions. Why not 200 million validated miracle cures? Did only 69 visitors pray for a cure in 157 years?

Problem of an Unknown God: Aquinas: One cannot know what God is but rather what he is not. Book of Job, Anselm, The Bible, Romans 11:33-34, John Duns Scotus, Pseudo-Dionysius, Martin Luther, Augustine, Gregory the Great (“If this be God, you have not comprehended it.”), Maimonides, Pascal, Ockham, & The National Catholic Almanac all say one cannot know what God is. Some theologians argue that “God is outside of time, space, and matter.” If these statements are true, it is logically impossible to authoritatively assert any proposition, good or bad, about the Abrahamic God or his/its existence (Nicholas of Kues / Cusa).

Paradox

The Problem of God-versus-the-World Paradoxes. There are numerous logical contradictions to the existence of the proposed Abrahamic God arising from the various supernatural claims for Him/Her/It, particularly omnipotence. The Problem of Evil is the most compelling of these paradoxes. Several others are described at AD 414. The Problem of Evil is a logical problem. It follows the basic rules of thought, as do the other Problems herein.

Faith

Faith: For most educated people, the concept of a loving, incomprehensible, omniscient, omnipotent, but also a do-nothing, unknowable, evil-and-suffering-permitting God is at best implausible. Religion is looked upon at best as a device to inculcate moral values and a fear of acting wrongly in the simpler classes and in children. So, many persons simply say that they are “spiritual” or believe that there is something beyond their understanding. John Paul 2 abandoned reason as Christianity’s “primary apologetic.” Absent a rational reason, some simply say that they have “faith” that there is a higher power. Atheists like Dawkins, Sagan, & Feynman found a sense of awe in the universe.

“Faith” validates all gods.

Sainthood, Miracles: While a miracle is currently a prerequisite for sainthood for Roman Catholics, the usual “miracle” now common in the canonization process is that someone somewhere, often a nun, was cured of some malady after touching something associated-with or praying-to the saint-candidate. While such “miracles” may suffice for canonization, they are usually personal and scientifically suspect. Simon Blackburn, “A little miracle or two snuffing out the Hitlers and Stalins would seem far more useful than that one changes water into wine at a wedding.” Hume, “Pick the less improbable miracle. What is more likely, that a miracle occurred, or that the report
Clever men, claiming influence of some sort with a supernatural power have always used the ignorance or gullibility of people to rule over them (ref. 1532). The strategy of creating a fear or a need and then proposing a solution is as common as advertising or politics.

**Why is there something?**

Von Leibniz had asked, “Why is there something rather than nothing?” (Why does matter exist?) Theists say that their God created matter and thus the universe. 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.”

Asking “why” is not a scientific question as it asks for a purpose of a natural event, the existence of matter. But natural events have no purposes. Thus, as phrased, it precludes a rational scientific answer, and all cultures from A to Z, Apaches to Zulus, have non-rational, non-verifiable, myths of creation (like Genesis). To say an unknowable incomprehensible concept, (a god) created the universe is as precise as saying, “A law of physics created the universe.”

**Why not?**

The Stanford Encyclopedia of Philosophy and Grünbaum doubt the premise of the question, i.e., the presumption that nothing is more logical than something and so should be the default position re matter. The SEP answers the question with, “Why not? Why expect nothing rather than something? No experiment could support such a hypothesis.” To many philosophers, this question is unanswerable, as it imposes an impossible explanatory demand; it asks one to deduce the existence of something without using any existential premises.

**How does matter exist?**

Cosmologists, however, study various hypotheses, grand unified theory, boom & bust cycles, Darwinian multiverse, brane universes, cosmological phase transitions, old inflation, new inflation, chaotic inflation, inflationary multiverse, pocket universe, string theory, vacuum stabilization, string universes, loop quantum gravity (to reconcile general relativity with quantum mechanics), particle-antiparticle pair production out of nothing, ‘quantum foam universe, M-theory. There is as yet no consensus. There may be a cause not yet found. But, said Aristotle, of contradictory statements, only one could possibly be correct. Both or all may be incorrect. Someone asked Feynman to explain in simple terms why he got the Nobel prize. He said that if it could be explained simply, it wouldn’t be worth a Nobel.

**Several theories**

The Christian clergy’s historic fear of thinking, *The Index of Prohibited Writings*: It was a sin for Catholics to print, own, read, or discuss, all or some, works of, *inter alia*, Abelard, Acton, Addison, d’Alembert, Francis Bacon, Balzac, de Beauvoir, Henri Bergson, Bruno, Bentham, Berkeley, Calvin, Compte, Copernicus, Croce, Descartes, Dante, Draper, Defoe, Diderot, Dumas pere et fils, Erasmus Darwin, Erasmus, Johannes Scottus Eriugena, Flaubert, Anatole France, Frederick 2 of Prussia, Galileo, Gesner, Gibbon, Gide, Goldsmith, Graham Greene, Heinrich Heine, Helvetius, Hobbes, Hugo, Hume, Kant, Mary Kowalska (later a saint), Kepler, the *Larousse Dictionary*, D H Lawrence, Locke, Luther, Machiavelli, Maeterlinck (Nobel prize in literature), Maimonides, Malebranche, Marx, Mill, Milton, Montaigne, Montesquieu, Paine, Pascal, Rabelais, Ernest Renan, Antonio Rosmini, Rousseau, Sand, Sartre, Spinoza, de Stael, Stendhal, Laurence Sterne, Swedenborg, Swift, Maria Valtorta, Voltaire, Zola, Zwingli, plus hundreds more authors, & all books saying the Earth orbits the Sun. Mein Kampf was reviewed & OK’d.

Those scientists and philosophers attacked by the Christian Church, such as Albertus Magnus, Roger Bacon, Vanini, Darwin, Pico della Mirandola, John the Scot, Ockham, Hus, and the Cathars were not threats to Jesus’ compassionate teachings. They were only threats to the clergy’s positions of authority and power.

(Dalai Lama, “There is no need for temples; no need for complicated philosophy...The philosophy is kindness.”)

**Clergy’s fear of ideas, the Index of Prohibited Writings**

The Christian clergy’s historic fear of thinking, *The Inquisitions*: Draper asserts that from 1481-1808, Inquisitions had tortured or imprisoned c340,000 persons, c32,000 of which were burnt at the stake, sometimes on the day the victim was accused. Ingersoll said, “Priests, hating heretics with every ounce of their bestial blood, acting under the command of their God, crushed bones in iron boots, with iron hooks, tore flesh from victims, with pincers cut off lips and eyelids, pulled out their nails, thrust needles into wounds, tore out their tongues and eyes, stretched them on racks, flayed them alive, crucified them with their heads downward, exposed them to wild beasts, burned them at the stake, ravished their wives, robbed their children, and then prayed to God to finish the job in Hell.”

Voltaire, “Anyone who can make you believe nonsense can make you commit atrocities.”

**Why Torture for God?**

H G Wells in 1902 said regarding the inquisitions, “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.” This also suggests why clergy throughout history felt it necessary to devise new arguments for God.
Clergy's historic fear of thinking, heresies: All religions oppose ideas that contradict and thus discredit their particular dogmas. The Bible and the Koran consign unbelievers to Hell. "He who does not obey the Son shall not see life, but the wrath of God rests on him." John 3.36. For Aquinas, the greatest sin was not murder or rape or torture but having a wrong opinion, the sin of not believing in Aquinas's God, i.e., not an action but a thought, an opinion.

Christopher Hitchens: “Theologians have never been able to answer the challenge that contrasts God’s claims to simultaneous omnipotence and benevolence,” H L Mencken (ref.1925): “Christian theology is not only opposed to the scientific spirit; it is opposed to every other form of rational inquiry. 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 agonies of man...can only retreat behind Chrysostom's despairing maxim, that 'a comprehended God is no God.'

The greatest scientist of his day, Roger Bacon, was confined for almost half his adult life for “suspected novelties” in his teachings. Dominicans could not study medicine or science except with special permission. Franciscans couldn’t study medicine or “science.” Newtonian physics was not taught in Catholic universities for a century. Just a century ago Pius 10 prohibited seminarians from reading newspapers & required seminarians to take an oath against “modernism.”

Leo 13: Unlawful to grant freedom of speech

Christian Churches have always decreed that scientific hypotheses could not contradict scriptures in any way, & even today Catholicism only accepts evolution if one believes that God at some time put a soul in Man & created Man in his own image. Recall, Pope Leo 13 said, “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.” Catholic scriptures are claimed to be “incapable of error.” Popes killed tens of thousands of Cathars for thinking they could worship Jesus without the Church’s supervision. Anabaptists and Quakers were similarly persecuted. Puritans burnt and drowned “witches”.

Original Sin was simply a desire for knowledge

Christians’ emphasis on persecuting wrong thinking, i.e., wrong opinions, is the opposite of the U S Constitution, whose First Amendment protects opinions. Jefferson & Locke: A state’s power doesn’t reach beliefs.

In Catholic & some other Christian sects’ dogmas, the very first sin, “Original Sin,” the act that caused all the evil & suffering for every man, woman & baby ever to come into the world & would then cause them to suffer in Hell for eternity unless they accepted Jesus as God, and acted as the Church directed, was nothing more or less than Adam’s desire for knowledge (an act of free will presumably given by and known to occur by God). The doctrine of Original Sin developed by Paul, Irenaeus, & Augustine, is a vital & pernicious concept for keeping the faithful in fear & obedient.

Samuel Johnson, “The...Roman Church...[has]...determined...what is a crime to do...it is a crime to think.”

Islam shares with Christianity a fear of heretical ideas. As illustrated in Faith-based Evil, p.187. Islam is a shame-based patriarchal culture. (Christianity is a guilt-based patriarchal culture.) Muslims have a spectrum of views, from moderate to extreme. The extreme faction, which is much stronger proportionately than such divisions in Christianity is particularly insecure and fearful of ideas considered disrespectful of its founder, Muhammad.

Islam (like Jews & Italians & other groups) has organizations dedicated to opposing ideas considered insulting.

Most clergy in all religions live devoutly without regard to their own personal position or ambition. The ruling clergy, however, have a more difficult job. They must maintain the raison d’etre of the enterprise and manage it. To do so, they must vouch for the sacred beliefs on which their enterprise is based, and try to reconcile such beliefs with the world. To question its teachings would destroy their credibility. Religions thus remain prisoners of their ancient myths.

Spinoza, "Immense efforts have been made to invest religion, true or false, with such pomp & ceremony that it can sustain any shock and constantly evoke the deepest reverence in all its worshipers."

To paraphrase Dawkins (p.178), The religions we perceive have precisely those properties (costumes, ceremonies, pomp, paradise, incense, their sacred language, mysteries, cathedrals) we should expect if they were at bottom simply stage props to give the appearance of a divinity.

As noted, if there is no divine power, all believers in the divine everywhere are worshipping air and all discussion and writings which assume the existence of the Abrahamic God are based on air. Christian clergy did to Albertus, Johann Reuchlin, Ockham, Joachim of Fiore, Wycliffe, Hus, Galileo, Vanini, Bruno, Roger Bacon, Dolet, della Mirandola, la Peyrere, & to other thinkers what Athens’s elders did to Socrates, what Jewish elders did to Jesus, what Cyril’s monks did to Hypatia, what Richard 2 did to John Ball, what Henry 8 did to Thomas More, what Presbyterians did to Aikenhead, what Innocent 3 did to the Cathars, & what persons in authority, be they secular
governments, or dictators, or the ruling clergy in religions, do to those whose ideas threaten their positions of power. They do their best to suppress them, almost always with force, not argument.

Clergy protect their turf.

The clergy's extreme opposition to ideas that conflict with their dogma, is thus best understood & analyzed as based not on theology but simply on the entirely human propensity to protect their position of power & prestige, i.e., to protect their turf. Voltaire, "In religion, [crime] does not mean actions hurtful to society, but actions hurtful to the clergy."

The hypocrisy of rulers’ use of religion as a cover for their self interest (ref. 1532, Force, Fraud, Favors) is the same as clergy’s use of theological arguments to oppose ideas that threaten their purely personal positions of power and authority. In other words, invoking a mysterious power is as convenient a cover for clergy as it is for dictators, kings, & demagogues. Similarly, disputes within Islam are often resolved by the sword, not diplomacy and compromise.

Clergy oppose both supernatural belief systems (witchcraft, other religions) on the one hand, & natural belief systems (science) on the other hand as they both compete with that clergy’s particular belief system.

Rulers and clergy have a common interest

Political Theory: The ruling class and clergy have a common interest to maintain their positions of inequality of power. Their mutual support benefits them both. One stark example was the Protestant Ascendancy in Ireland where the small ruling class of Anglican clergy, professionals & landowners brutally controlled the mostly Catholic population.

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."

Robert Ingersoll, "In all ages hypocrites called priests have put crowns on the heads of thieves called kings.

David Hume, "Liberty of thinking, and of expressing our thoughts is always fatal to priestly power....In all ages of the world, priests have been enemies to liberty; and it is certain, that this steady conduct of theirs must have been founded on fixed reasons of interest and ambition. H L Mencken, "At all times [the clergy] have been the bulwark of orthodoxy in politics. Their prayers always go up for kings, not for...reformers

Thomas Hobbes, (1651) "Religions were formed and sustained by people in power to control their subjects."

Dostoyevsky’s Grand Inquisitor (ref.1880) explained to Jesus why the clergy had to lie to their believers.

Most educated people in the West and the East believe that natural laws govern the universe and that man, with all his limitations, can and is discovering such natural laws. However, billions of people, mainly Christians and Muslims, believe there is a supernatural power above such natural laws, beyond reason and beyond logic.

What do Americans know?

Episcopalian Bishop Henry Hobson, "A great majority of our members are woefully ignorant so far as any real knowledge of the Christian religion...Judged by any standard, they are in the moron class."

A 2010 Pew poll: 55% of Protestants don’t know Martin Luther started the Reformation.

A 2010 Pew poll: 58% of white Evangelical Christians say Jesus will definitely or likely return by 2050 (End of world).

A majority of Americans can’t name the first book of the Bible. 1/3 of Americans believe in the literal words of the Bible.

A 2011 Newsweek poll: 38% of 1000 adult Americans flunked the standard citizenship test. 1/3 couldn’t name the VP.

47% of Americans could not say how long it takes the Earth to orbit the Sun, i.e., how long a year is.

A National Science Foundation poll: 20% of Americans believe the Sun revolves around the Earth.

A 2014 Pew poll: 43% of adult Republicans believe in evolution. 60% of adult Democrats believe in evolution.

A 2014 University of NH Casey Institute poll: 28% of Tea Party Republicans trust scientists.

A 2014 Gallup poll: 42% of Americans believe God created Man under 10,000 years ago, the lowest percentage of all industrialized nations. In Turkey, the most advanced Muslim country, it’s 16%. Islam flatly denies evolution.

2014: Professors Tony Yates & Edmund Marek found that 25% of Oklahoma high school biology teachers thought Man & dinosaurs co-existed.

A 2008 study of 939 high school biology teachers, found 16.7% were creationists.

2015: The Educational Testing Service says Dutch, Japanese, & Finnish high school graduates know as much as young US college graduates. Of 22 industrialized countries, the ETS says the US is last in tech proficiency & numeracy, and twentieth in literacy proficiency.

Scientists & philosophers differ from the general population. The National Academy of Sciences says 7% of its members believe in God. 14% of English speaking professional philosophers, mainly academics, believe in God.

Socrates, “The only true wisdom is knowing you know nothing.” Johann Goethe, “Doubt grows with knowledge.”

Pierre Simon de Laplace, “What we know is not much. What we do not know is immense.”

H. G. Wells, “Our world today is only in the beginning of knowledge.”

G. C. Lichtenberg, "Perhaps in time the so-called Dark Ages will be thought of as including our own.”

Karl Popper, “Our knowledge can only be finite, while our ignorance must necessarily be infinite.”

Thomas Huxley, “Intellectually we stand on a little islet in the midst of an illimitable ocean of inexplicability.”

Richard Feynman, “We are at the very beginning of time for the human race.”

Shakespeare, Hamlet, There are more things in heaven and earth, Horatio, than are dreamt of in your philosophy.
Astronomy / Cosmology  Timeline of Knowledge and Beliefs Regarding the Universe

All cultures have their creation myths. All known creation myths are false. David Lemming's Creation Myths of the World says that myths of creation ex nihilo (from nothing) was as common as creation from a pre-existing watery chaos. The Genesis account of creation ex nihilo was common at the time.

5000 BC Mesopotamians posit a flat circular Earth enclosed in a cosmic ocean.
3000 BC Babylonians: A flat circular Earth floats in infinite “waters of Chaos” with a dome to keep out the Chaos.
2136 BC Chinese astronomers recorded a solar eclipse.
2000 BC Hindu Rig-Veda, The universe is infinite in time, and cyclical. This cycle of the universe is eight billion years old.
750 BC Babylonians discovered the 18.6 year cycle of the Moon, made movement tables for the Sun and 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 Babylonian myths)
515 BC Parmenides: Universe is finite and spherical, unchanging, uniform, perfect, necessary, timeless, and neither generated or perishable. Greeks: Night sky is a shield with pinpricks of celestial light shining thru.
c500 BC Pythagoras, 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.
c450 BC Philolaus, a Pythagorean, suggested that the Earth orbited the Sun.
c450 BC Anaxagoras: It’s an atomist universe, with an infinite number of atoms and an infinite void. There are no gods.
c387 BC Plato: The Sun, Moon, and stars orbit the Earth in perfect circles. The Sun is the greatest planet.
c380 BC Babylonians saw a bright band of stars around the Earth, called it the Milky Way, Via Lactea.
350 BC Heraclides is credited with saying the Earth rotated, suggested that Venus and Mars orbited the Sun.
300 BC Stoic Universe: The cosmos is finite and surrounded by an infinite void. It pulsates in size.
300 BC Aristotle: Earth is the center of universe, finite in extent, infinite in time surrounded by celestial spheres, static.
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 to be what would now be known as two light years.
240 BC Eratosthenes using shadows calculated Earth’s diameter at 7940 miles (It’s 7926) & its tilt relative to the Sun.
c164 BC Babylonians recorded a comet later called Halley’s.
c146 BC Hipparchus made the first accurate star map, with 850+ stars, and used parallax to calculate Earth-Moon distance at 380,000 km.
146 BC Seleucus: The Earth rotates and orbits the Sun. He theorized that 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 499 Aryabhata: Planets rotate and orbit Sun in ellipses, reflect light from the Sun. Earth diameter 13,380km. 5% high.
c500 Brahmagupta showed methods to calculate planets’ motions; said gravity was a force of attraction.
830 Al-Khwarizmi wrote tables for the movements of the Sun, Moon, and the 5 known 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 and the Magellanic Cloud, wrote Book of Fixed Stars.
c1000 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.
c1250 Al-Haytham wrote al-Shuku ala Batlamyus / Doubts on Ptolemy. But it did not doubt Ptolemy’s geocentricism.
1031 Abu Said Sinjarri suggested the Sun was the center of the universe, heliocentrism.
c1040 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.
c1100 Western Medieval world view: God created the world in 7 days in its present form just a few thousand years before; Earth is the center of the universe; all planets and stars orbit Earth in circular orbits; Earth is essentially flat. Earth’s physical laws don’t necessarily apply to heaven; Man was created last and owns everything.
c1180 Fakhr al-din al-Razi rejected Aristotle geocentrism, said that the universe had more than a million worlds.
c1250 Qutb al-Din al-Shirazi, heliocentrism is possible.
1250 Nahmanides suggested the universe is expanding and that there are 10 dimensions.
c1320 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.
c1450 Ali Qushji gave empirical evidence that the Earth rotates. He rejected geocentrism.
c1514 Nicolas Copernicus’s Commentariolus, given only to friends and colleagues, said Earth and planets orbit the Sun.
1785    Herschel posited our Sun was in a group of several million stars, shaped like a flattened disc.
1785    They are invisible. Later their existence was established; now called black holes.
1842   Christian Doppler predicted that light waves would show a change in frequency if the object were
1842   approaching or receding from the observer, like his discovery of that characteristic of sound waves.
1802   William Wallaston saw dark lines in the solar spectrum.
1802   Joseph von Fraunhofer split sunlight with a prism, showed 574 dark lines in sunlight’s spectrum, he detected
1802   sodium in the Sun. crucial to later study, saw that the spectrum of a gaseous body is dis-continuous.
1814  Erasmus Darwin described a cyclical expanding and contracting universe.
1795    Pierre Simon Laplace discussed classical bodies with escape velocities over the speed of light. (He was right.)
1795    Thomas Wright speculated that the universe is finite. Gravity keeps it together. Matter on the large scale is uniformly
1796    Laplace posited the solar system formed from a spinning nebula of gas and dust.
1796    Robert Hooke: All planets have an attraction to each other, the precise attractive strength unknown.
1791    Erasmus Darwin described a cyclical expanding and contracting universe.
1799    Laplace calculated the planets’ orbits were ellipses. Halley said, “Publish it.”
1783    John Michell posited regions in space whose gravitational attraction was so strong it would attract and engulf
1783    groups of stars beyond the Milky way.
1670     Isaac Newton: The universe is static. Gravity keeps it together. Matter on the large scale is uniformly
1670     Halley, Earth-Sun distance can be deduced by measuring the transit of Venus across the face of the Sun. Done.
1665     Giovanni Cassini, director of the Paris Observatory, determined the rotational speeds of Jupiter, Mars, and Venus.
1665     Christiaan Huygens: Mars rotates every 27.67 hours; he saw Saturn has rings and a satellite / moon, Titan.
1665     Edmund Halley mapped 341 stars seen only from the Southern hemisphere, earned entry in the Royal Society
1669     Robert Hooke: All planets have an attraction to each other, the precise attractive strength unknown.
1665     Giovanni Cassini discovered the star Argoll is not steady in brightness, i.e., a variable star.
1662    Jean Richter showed that due to centrifugal force, the Earth bulges at the Equator. (He was right.)
1669     Johannes Kepler's 3 laws of motion explained the tides, Kepler's laws, and all objects in the universe.
1655     Geminiano Montanari discovered the star Argoll is not steady in brightness, i.e., a variable star.
1665     Edmund Halley mapped 341 stars seen only from the Southern hemisphere, earned entry in the Royal Society
1669     Robert Hooke: All planets have an attraction to each other, the precise attractive strength unknown.
1705    Edmund Halley: Comets of 1531, 1606, & 1682 is same comet; it will return in 1758. It did, so named after him
1750    Halley calculated the shadow path of a solar eclipse.
1755    Immanuel Kant, saw the Andromeda nebula in the Milky Way constellation of Andromeda, posited that cloudy
1755    points of light in the heavens are island universes far away, beyond the Milky Way, our island universe.
1774    Charles Messier found 100 cloudy points of light in the heavens, called them nebulae, Galaxies were then
1774    unpredicted. 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.
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1843   Heinrich Schwabe said sunspots had regular cycles, estimated the sunspot cycle to have a period of c10 years
1845   John Adams and Urbain Le Verrier said that a planet must exist that caused an anomaly in Uranus's orbit.
1845   Lord Rosse discovered a nebula with a distinct spiral shape.
1845   Johann Galle saw Neptune where Vernier predicted. William Lassell saw its moon Triton 17 days later.
1848   Hippolyte Fizeau saw a redder end of the visible light spectrum in the spectrum of stars (red-shift).
1848   James Clerk-Maxwell said the apparent solid ring around Saturn was many tiny satellites. A solid ring would tear apart.
1855   Gustav Kirchoff and Robert Bunsen discover that each element has a distinct pattern of spectral lines.
1857   James Clerk-Maxwell showed that light was a subset of the wavelike phenomenon by which charged particles interact, known as electromagnetic radiation of the electromagnetic spectrum.
1865   Giovanni Schiaparelli said a meteor stream occurs when Earth passes through a comet's orbit that left debris.
1865   Hippolyte Fizeau said a shift in the spectral lines of stars was due to the Doppler effect.
1868   William and Margaret Huggins used Doppler effect of electromagnetic waves to calculate how fast stars receded.
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 subsequently found on Earth and isolated.
1872   Henry Draper photographed the spectrum of Vega. Showed importance of spectrography in understanding stars.
1877   Asaph Hall discovered moons of Mars.
1877   Giovanni Schiaparelli saw canals on Mars.
1893   Wilhelm Wien, An object's temperature could be determined by the color the object emitted most intensely.
1905   Einstein posited special relativity, space and time are not separate continua.
1906   Enjar Hertzsprung measured brightness of stars, showed a relationship between color and size of the star.
1908   Enjar Hertzsprung described giant and dwarf stars.
1912   Vesto Slipher measured red-shifts and blue-shifts of stars and nebulae; deduced most nebulae receded from Earth.
1913   Neils Bohr showed details of an object's spectrum could identify the object's chemical composition.
1914   Harlow Shapely using the cephids derived the overall shape of the Milky Way. He determined our solar system was on the outskirts of the Milky Way. Hubble used the technique in 1924 for Andromeda.
1915   Einstein's general theory of relativity showed that density (presence of stars & nebulae) warps space-time.
1916   Henrietta Leavitt confirmed that brighter Cepheids, variable stars, had longer, regular, and predictable periods.
1916   Karl Schwartzschild 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.
1917   Vesto Slipher (1912) saw nebulae with redder shifts than stars thought to be in our Milky Way galaxy.
1917   Willem de Sitter said that Einstein's unadjusted equations, properly solved, implied the universe is expanding.
1919   Eddington showed that light from a distant star was attracted by gravity as Einstein predicted, 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 position against Harlow Shapely in a great debate in Washington DC.
1922   Alexander Friedmann, Universe may be expanding, based on Einstein’s field equations. Most astronomers (and Einstein) at the time thought the universe was static.
1922   Jan Oort calculated the center of the Milky Way. In 1928 he confirmed that the Milky Way rotates.
1925   Cecilia Payne said the Sun is 90+% hydrogen.
1927   Georges Lemaitre, priest: Universe began with an explosion from a single point, a singularity, called the Dynamic Evolving model of the universe, governed by Einstein field equations. In 1950, it became called the Big Bang.
1927   J.B.S. Haldane, Universe is not only queerer than we suppose, but queerer than we can suppose.
1928   Howard Robertson said Slipher’s 1912 red-shift measurements combined with brightness measurements of the same galaxies indicated a red-shift-distance relation.
1928   Hubble’s law: Galaxies receding speed is proportional to distance from Earth, thus the universe is expanding.
1930   Arthur Eddington showed that the universe was expanding.
1930   Seth Nicholson measured the surface temperature of Mars. Clyde Tombaugh discovered Pluto, .02 the mass of Earth
1932   Karl Jansky detected radio waves coming from space. This was ignored for decades.
1933 Jan Oort: Density of matter near the Sun is 2X more than visible planets would explain, first evidence of dark matter. Said the Milky Way had a mass 100 billion times that of the Sun.

1933 Fritz Zwicky saw the gravitational mass in the Coma cluster of galaxies was far greater than its luminosity (a measure of mass) indicated, so he inferred there existed some great mass of non-visible matter but with a gravitational attraction that was keeping the cluster from expanding apart. He called it dark matter.

1933 Bell Labs discovered that radio waves were coming not just from the Sun, but from stars all over the universe. This was the birth of radio astronomy which can detect stars beyond the vision of telescopes.

1933 Wilhelm Baade and Fritz Zwicky proposed that supernova could produce cosmic rays and neutron stars.

1939 Hans Bethe: In the Sun two hydrogen atoms fuse (fusion) into helium, releasing photons, vast energy, sunlight.

1940 Thomas Gold, Hermann Bondi, and Fred Hoyle posited a Steady State model of the universe.

1948 George Gamow and Ralph Alpher: Hydrogen and helium are 99.99% of the universe. Evidence for the Big Bang model.

1948 Gamow and Alpher predicted the existence of cosmic microwave background radiation.

1950 Fred Hoyle (Steady State Model) derided the Dynamic Evolving model as the Big Bang, the name stuck.

1952 Walter Baade: Distances to galaxies are twice as large as then thought, so doubling the size of the universe.

1953 The Big Bang model of the universe was found to explain the origin of Helium. Steady State model doesn’t.

1961 Jan Oort discovered that comets come from an area 9 trillion miles from the Sun, now called the Oort Cloud.

1961 Big Bang model posited young galaxies could only exist in a young universe.

1961 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).

1963 Maartin Schmidt measured spectra of quasars, very distant galaxies.

1965 Ezra Newman and others solved the Einstein-Clerk-Maxwell field equations for charged rotating systems.

1965 Arno Penzias and Robert Wilson (Bell Labs) discover radio waves from all over the universe. Remnant of the Big Bang. This began the field of radio astronomy which can detect matter beyond the scope of telescopes. Radio astronomy indicated that radio (younger) galaxies appeared mostly in the far reaches of space.

1966 James Peebles showed that the hot Big Bang model predicts correct abundance of helium, Steady State doesn’t.

1966 Stephen Hawking and George Ellis show that any plausible general relativistic cosmology is singular.

1967 Robert Wagoner, William Flower, and Fred Hoyle showed that the hot Big Bang Model predicts the correct abundances of deuterium and lithium.

1967 Jocelyn Bell & Antony Hewish found a new type of star, very distant, extremely dense and spinning, a pulsar.

1968 Carl Sagan: The universe has 100 trillion, trillion stars.

1968 Brandon Carter: The fundamental constants of nature must be in a narrow range for life to exist. (The strong anthropic principle) The two anthropic principles together form the Anthropic Argument for a God.

1972 Stephen Hawking proved that the event horizon of a black hole could not decrease.

1972 Charles Bolton showed irrefutable evidence of black holes.

1972 James Bardeen, Brandon Carter, and Hawking propose 4 laws of black hole mechanics.

1972 Jacob Beckenstein suggested that black holes have an entropy proportional to their surface area.

1973 Jeremiah Ostriker and James Peebles discover 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 postulated dark matter to provide the necessary gravitational pull to keep the discs together.

1973 Edward Tryon: The universe may be a large scale quantum mechanical vacuum, positive mass-energy balanced by negative gravitational potential energy.

1974 Hawking applied quantum field theory to black holes and showed black holes will radiate particles with a blackbody spectrum which can cause black body evaporation.

1978 Vera Rubin: 60 galaxies rotate faster than their visible presumed mass could explain. So some non-visible matter with a gravitational effect exists to keep them from flying apart. More evidence of dark matter.

1980 Alan Guth and Alexei Starobinsky separately said the Big Bang Model may solve the horizon and flatness problems.

1981 Robert Kirshner, August Oemler, Paul Schlecter, and Stephen Schectman see evidence of a huge void in the galaxy Boote around 100 million light years across.

1981 Viacheslav Mukhanov: Quantum fluctuations could lead to large structures (stars, planets) in an expanding universe.

1982 Several independent cosmological researchers said the universe is mostly dark matter.

1983 Alexander Velenkin, cosmologist posited the eternal multiverse hypothesis.
1980s Stephen Hawking and others: \textit{Wave function} inferred a 95\% probability that the universe was uncaused.

1980s Clusters of galaxies discovered organized into giant bubbles measuring $c300M$ light years across.

1986 Andrei Linde elaborated on the eternal multiverse hypothesis showing how it was possible the universe reproduces itself indefinitely and may have no beginning or end.

1987 David Burstein \textit{et al} claim a large group of galaxies $200M$ light years from the \textit{Milky way} are moving together.

1990 Hubble orbiting space telescope launched; found most galaxies have a super-massive black hole at their center.

1991 Hubble telescope, in low Earth orbit, found pancake shaped objects in a distant cloud of dust and gas. First views of protoplanetary disks- the birthplace of stars and planets.

1992 Minute variations were found in cosmic background radiation; showed that there were areas in the universe where gravity could allow matter to coalesce and stars and galaxies to form. Hawking called it the discovery of the century, if not of all time. First exoplanets found, orbiting a pulsar.

1992 Hubble telescope found evidence of dark matter in galaxies too small to bend light rays.

1993 Hubble telescope found galaxies in mid-collision, with spectacular streams of stars, gas and, dust.

1995 A planet was detected that orbited a star outside the \textit{Milky Way}. Soon more such planets were discovered.

1998 Some kind of non-visible energy appeared to be causing certain galaxies to accelerate apart faster than their known/visible mass would permit. Such unknown energy was thus named dark energy.

Astrophysicists discovered that “empty” space contained $10^{-29}$ grams of invisible matter per cubic centimeter.

1998 \textit{Andromeda} galaxy was estimated to have 1 trillion stars, twice the \textit{Milky Way}’s.

2010 Stephen Hawking and Leonard Mlodinow: —theory indicates spontaneous creation caused the universe, Spontaneous creation is the reason there is something rather than nothing, why the universe exists, why we exist. It is not necessary to invoke God to...set the universe going.”

2012 Lawrence Krauss: A quantum fluctuation created the universe.

2012 Suvi Gezari \textit{et al} published an image of a massive black hole engulfing a red giant.

2012 The Large Hadron Collider probably discovered the Higgs Boson.

2012 NASA found millions more black holes. The Very Large Telescope (visible light and infrared telescopes) in Chile detected 12 large dark, i.e, starless, 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 two years detected 400,000 positrons, an amount consistent with models of dark-matter particle collisions.

2013 Biologist Louis Irwin speculated that the Kepler spacecraft found that .1\% of the Milky Way’s c100 B planets are potentially habitable.

2013 The Dragonfly Observatory (10 16 inch telescopes, 10X more sensitive than large telescopes) found 50 dwarf galaxies near the Milky Way, each embedded in a halo of dark matter. Each has 100 times more dark matter than visible matter.

2014 The current Standard Model of Cosmology: 1. Physical laws are the same everywhere. 2. The universe is cooling and expanding from a single dense hot point explosion c13.8 B years ago, the Big Bang. 3. The early universe was a soup of energy and matter. 4. It first made particles that became protons, neutrons, electrons. 5. Galaxies, stars, planets formed after a few hundred million years. 6. The universe is isotropic (it looks the same in every direction) and homogeneous (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 $c4.6\%$ visible matter, $c24\%$ non-visible cold dark matter, and $c71.4\%$ non-visible dark energy. (assuming dark matter exists).

2014 Rosetta spacecraft orbited a comet after a 10 year flight. After 17 months orbiting, it will put a lander down.

2014 Liquid water was detected 20 miles under Saturn’s ice surface. Over 1800 exoplanets have been discovered.

2014 A black hole 12 billion times bigger than the Sun was detected in a distant quasar, 2X+ bigger than any other known.

2015 NASA said the \textit{Milky Way} may have c1 billion Earth-like planets. Kepler telescope identified 4661 such exoplanets, including one at a orbit around the star \textit{Kepler452} (that could contain water) that was 1.6 times Earth’s size.

2025 The Advanced Laser Interferometer Gravitational Wave Observatory detected two massive black holes, 29 and 36 times bigger than the Sun collide. The black holes were twice as massive as known ones although vastly heavier ones are at the center of some galaxies.

2016 Caltech astronomers predict a 9\textsuperscript{th} planet in our solar system, 10X bigger than Earth & 10-20X further away than Pluto.

2016 NASA and the European Space Agency said the universe is expanding 5-9\% faster than previously known
Evil done in the name of a god is common. The *Old* and *New Testaments* and the *Koran* have messages of both peace and war. Evil has been done on a large scale by persons claiming to be acting for their god. Indeed, there virtually no current aggressive movements not religious in inspiration. [except perhaps Russia] There are no historical examples of someone saying, “I fight X for the cause of atheism.” God is, of course, not the only excuse for committing evil; manifest destiny, *Lebensraum*, patriotism, “self-defense” are also excuses.

Recall Pascal” “Men never do evil so completely and cheerfully as when they do it from religious conviction.”

And Voltaire: “Anyone who can make you believe nonsense can make you commit atrocities.”

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.”

Steven Weinberg: “Good people do good things. Evil people do evil things. But for good people to do evil things; that takes religion.”

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**Evil in the Name of a God**

**Faith-Based Evil**

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A significant problem with some religions is that they justify *and command men to kill*.

Voltaire: *The Hebrew Bible* indicates c239,000 Jews were killed by other Jews at God’s order. Reinhold Niebuhr: “The tendency to claim God as an ally for our partisan values is the source of all religious fanaticism.”

Amerindians, Anabaptists, accused witches, atheists, Aztecs, Baha’is, Cathars, Catholics, Huguenots, Hindus, Incas, Jews, Jehovah’s Witnesses, Lutherans, Mormons, Muslims, Nicene Christians, Protestants, Palestinians, Puritans, Rastafarians, Quakers, Zoroastrians, all have killed or been killed due to their belief in some god.

Some ongoing evils, such as slavery, the subjugation of women, anti-Semitism, prejudice (against persons of different sexual orientations, religions, races, ethnic groups, & heretics of all sorts), are evils sanctioned by religions. They each give rise to innumerable specific acts of evil, a few of which are listed below.

The *Christian* concept of Original Sin has terrified Christians for 2000 years.

John Gray, philosopher, said that Christianity brought the evil of sexual repression unknown to pagans.

In AD 415, Christian monks stripped and murdered the prominent teacher, Hypatia, because she was a pagan.

In 1095, at the *Council of Clermont*, Pope Urban II declared that some wars could be deemed as not only a *bellum iustum* (“just war”), but could, in certain cases, rise to the level of a *bellum sacrum* (holy war).

In the 12th century, Saint Bernard of Clairvaux 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.”

1209: The Albigensian Crusade against Christian Cathars wiped them out. Arnauld, the Pope's Christian Commander, said the massacre of the Christian Cathars at Beziers was a “divinely inspired” event.

Catholic inquisitions in Goa, Mexico, Portugal, and Spain, forced conversion of indigenous children.

All the crusades murdered tens of thousands of Muslims and Jews in the name of the Christian God.

In 1452, Pope Nicholas 5 instituted the hereditary slavery of captured Muslims and pagans, regarding all non-Christians as "enemies of Christ."

**Anti-Semitism** was pervasive in Christian thought from the beginning and continues to this day. Christians have expelled Jews from several countries and stolen their property, always citing the *Bible*. The persecution of Alfred Dreyfus exposed French anti-Semitism. The Holocaust murdered c6 million persons, almost all Jews.

Hitler claimed he was “fighting for the Lord” regarding his actions against the Jews.

1478 The Spanish Inquisition was led by Dominican Friar Tomas de Torquemada. It tortured and killed thousands.

Pedro Arboles, an official in the Spanish Inquisition, said, “Innocent or not, let the Jew be fried.”

As noted by Machiavelli, (1532) rulers continually claim that their authority is authorized by God.

1536+ The Portuguese Inquisition used torture, burning, imprisonment, and theft of the victim’s properties.

1559+ The Catholic *Index of Prohibited Writings* damaged scholarship for centuries.

1500s-1600s Catholic Protestant wars devastated Europe. The popes blessed the Christian soldiers.

The Church’s Inquisition persecuted thousands of accused heretics and witches, including Bruno, Vanini, and Galileo, using torture, burning, imprisonment, and then theft of the victim’s property.

The *Bible* and the *Koran* consign unbelievers to Hell.

American slave owners cited the *Bible* as the justification for owning slaves.

Christian clergy threatened eternal torture for disobeying the rules of Christianity.

In America, discrimination against Quakers and Mormons was based on religion.

The Hindu Caste System persists. Hindu widows were expected to immolate themselves when their husband died.
Inter and intra religions’ strife. After Indian independence Muslims and Hindus fought. One million died.
The persecution of Peter Abelard was based on his supposed heretical teachings.
Hindu child brides are flogged and sometimes burned alive when their dowry is considered too small.
1200s-1500s The Aztecs and Inca priests murdered thousands as sacrifices to their gods.
1579 Anglicans burned Matthew Haymont for denying Jesus’ divinity
St Bartholomew Days Massacre, several months long. Christians killed around 50,000 Protestants.
1600s Puritan persecuted “witches” in the Salem witch trials.
Clergy of Catholic and other religions have used their power as clergy to keep abused children silent.
1763, A Huguenot was tried for murder for killing his son who converted to Catholicism. Voltaire bitingly
criticized the bigotry of the trial. “The people of Languedoc have religion enough to hate and persecute, but not
enough to love and succor.” Man has never been so cruel as when he has waged war in the cause of religion.
Hitler said that he was acting for the Lord in his actions against the Jews.
In 1947, in India, Hindus and Muslims fought because of their religious differences. One million were killed.
Columbia U fired professor Lionel Trilling for being a Jew, as “Jews couldn’t really appreciate English literature.”

In recent times:
In Pakistan, a woman can be sentenced to be raped, by tribal & Muslim kangaroo courts, if even a rumor of her
immodestly brings shame upon her menfolk. For men, moral courage is the willingness to butcher your daughter.
2001, Osama bin Laden murdered three thousand in New York’s World Trade Center in the name of Allah.
2001, A 13 year old girl became pregnant after her father pimped her. An Islamic court gave her 180 lashes.
2002, Mecca. Saudi religious police, the Wahhabist Commission for the Promotion of Virtue & Prevention of Vice
beat school girls trying to escape a fire as the girls weren’t wearing head scarves. 15 girls died
2002, Nigeria. Muslim rioters protesting the Miss World pageant killed 200 as contestants wore bathing suits.
2005, George W Bush told Palestine ministers that God told him to invade Iraq.
2005, 17 Muslim governments demanded Denmark punish those who published cartoons of Muhammad.
2006, In post-Taliban Afghanistan, following the Koran and Afghanistan’s new constitution, a Muslim man was
sentenced to death for becoming a Christian. Islamic law mandates stoning adulterers and homosexuals.
In the US, Mormon fundamentalists use the terrible threat of Hell to coerce young girls into submitting to sex.
2007, Karoda, India, 2 persons of the same clan(common ancestor sometime) married. Per Hindu law, both 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 a stadium. In Iran the age of consent for brides is 9.
In Israel, Orthodox Jewish modesty police terrorize young women who talk to men, force women to sit in the back
of busses, invade their houses, stone “immodest” women; once sprayed acid in the face of a 14 year old girl.
2009, Gary Hensley, chief US Army chaplin in Afghanistan, 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.”
2009, Brazilian Catholic Church excommunicated a mother who authorized an abortion to save the life of a 9 year
old rape victim (pregnant with twins by her stepfather) & the doctor who preformed it. The Vatican approved.
2009 Muslim virgins set for execution are raped before their execution as the Koran forbids executing virgins.
2010, Pakistan sentenced a woman to death for blasphemy, asking what Muhammad had done for Man. A Muslim
then shot and killed the governor of Punjab who tried to change the blasphemy law.
2011, Bangladesh Muslim clerics ordered a 14 yr old rape victim flogged. She died after 80 lashes.
2011, Libyan Ghaddafi soldiers raped 3 sisters. Their father then killed them to “lift the shame from his family.”
Saudi women need their male guardian’s OK to travel, see a doctor, open a bank account, go to school, or work.
2012, Islamists in Timbaktu publically gave a 15 year old girl 60 lashes for speaking to men on the street.
2012, Catholic auxiliary bishop of Mumbai praised enforcing India’s blasphemy law (illegal to outrage religious
feelings of any class by insulting its religion) used to prosecute a man who exposed a fake weeping crucifix.
2014, Sudan Christian woman, Muslim father, Christian mother, was sentenced to death for marrying a Christian
In America, Christians murder abortion doctors based on their Christian beliefs. Some religions prohibit use of
medicine; so innocent children and babies die from diseases that medicines could have cured.
2014, Islamists al-Shabaab, killed 28 bus riders who couldn’t recite a part of the Koran, to show they were Muslim
2015, In Paris, Muslims murdered 12 journalists for ridiculing Muhammad, and a few days later murdered 4 Jews.
2015, In Saudi Arabia. A Muslim court sentenced a young man to death for renouncing his Muslim faith.
Since 2013, Bangladesh ISIS Muslims have hacked to death “infidels,” a blogger, his publisher, doctors, teachers.
Currently, ISIS / ISIL, Boko Haram and Al Qaida are Muslim inspired terrorist organizations.
The Lord’s Resistance Army, a vicious terrorist organization in Uganda claims to be acting for God.
Muslim suicide bombers kill hundreds every year. Jews and Muslim Palestinians are in perpetual war. #
### Logical Fallacies

The advance of knowledge depends on clear reasoning. See [www.laetusinpraesens.org/links/webcrit.php](http://www.laetusinpraesens.org/links/webcrit.php)

Arguments consist of premises and a conclusion. Logical fallacies are errors in argument/reasoning. Poorly argued opinions, perhaps containing logical fallacies probably are, but are not necessarily wrong. Some logical fallacies are:

<table>
<thead>
<tr>
<th>Name of Fallacy</th>
<th>Descriptions</th>
<th>Examples</th>
<th>Many fallacies are fallacies of relevance, premise is irrelevant to conclusion.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ad Hominem</strong></td>
<td>Attack the speaker not his idea. He's a Commie, reads Karl Marx, so he's wrong.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Ad Hominem Tu Quoque</strong></td>
<td>You did it too, so it's OK.</td>
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<tr>
<td>Guilt by association</td>
<td>All his friends are Commies / fags, etc., so he's a Commie / fag, etc. (like Ad hominem)</td>
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<td></td>
</tr>
<tr>
<td>Appeal to faith</td>
<td>It's in the Bible/Koran/Vedas/Analects, so it's true. (Appeal to Divine Authority)</td>
<td>-</td>
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</tr>
<tr>
<td>Appeal to common belief</td>
<td>al/k/a Truth by Majority Opinion, al/k/a Band Wagon. Everybody does it, so it's right</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Appeal to tradition</td>
<td>It's always been done this way. So this is the right way to do it. (Appeal to Authority)</td>
<td>-</td>
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</tr>
<tr>
<td>Appeal to emotion</td>
<td>See all the handsome happy people drinking Bud Light (Bud plus water). (Bandwagon)</td>
<td>-</td>
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<tr>
<td>Appeal to patriotism</td>
<td>Stand up for America, Vote for the man who loves his country, a real American, Vote for X.</td>
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<tr>
<td>Appeal to pride</td>
<td>Think how proud you'd be if your son were a Marine.</td>
<td>-</td>
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<tr>
<td>Appeal to fear</td>
<td>You'll burn in Hell if you don't: 1. Believe-in-God. 2. do-such-and-such. 3 Go to church.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Appeal to flattery</td>
<td>You are such an astute investor I know you'll see the value in Schlock Inc. securities.</td>
<td>-</td>
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<tr>
<td>Appeal to motive</td>
<td>You're just saying that because you love/hate me, or... Because you're a Democrat</td>
<td>-</td>
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<tr>
<td>Appeal to probability</td>
<td>Soccer fans are thugs. So if we have a soccer team here, thugs will ruin the town.</td>
<td>-</td>
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<tr>
<td>Appeal to prejudice</td>
<td>Only fags wear garters. In politics, &quot;He's a real American.&quot;</td>
<td>-</td>
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<tr>
<td>Appeal to ridicule</td>
<td>&quot;Hey, Macaca, Welcome to America.&quot;</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Appeal to vanity</td>
<td>Buy this suit, you'll look sharp. Real men chew tobacco. This 'Vette hits 60 in 4.5 seconds</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Appeal to popularity</td>
<td>You'll be popular if you use Dial. Most everybody believes X, so X must be true</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Appeal to novelty</td>
<td>It's new, so it's good. That's an old argument, it's outdated. So, forget it. (Non sequitur)</td>
<td>-</td>
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<tr>
<td>Hasty generalization</td>
<td>His hands are sweaty, don't trust him. (Non sequitur)</td>
<td>-</td>
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<tr>
<td>Transferred expertise</td>
<td>Expert in one field considered expert in another field. (Non sequitur)</td>
<td>-</td>
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<tr>
<td>Racial/sexism fallacy</td>
<td>it's a woman / guy / black / gay thing; you wouldn't understand. (Non sequitur)</td>
<td>-</td>
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<tr>
<td>Naturalist fallacy</td>
<td>Whatever is &quot;natural&quot; is healthy/good. (Non-sequitur)</td>
<td>-</td>
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<tr>
<td>Argument from ignorance</td>
<td>You can't prove UFOs / God / X don't exist. So they / He / it must exist. (Non sequitur)</td>
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<tr>
<td>Argument from inference</td>
<td>No one knows what caused X; so it must have been done by a supernatural force / a god. Reductum ad Hitlerum</td>
<td>-</td>
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<tr>
<td>Genetic fallacy</td>
<td>That's what Hitler/Stalin/bin Laden would say. (Relate statement to a repugnant authority)</td>
<td>-</td>
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<tr>
<td>False analogy</td>
<td>Flying a plane is like riding a bike.</td>
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<tr>
<td>Middle ground</td>
<td>Joe says dogs cause warts. Bob says no. So maybe some dogs cause warts.</td>
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<tr>
<td>Fallacy of composition</td>
<td>Something true of a part is true of the whole. Don't confuse with Induction.</td>
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<tr>
<td>Hidden agenda</td>
<td>Billionaire says, &quot;Senator X is anti-business.&quot; His hidden agenda, &quot;X wants to raise my taxes.&quot;</td>
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<tr>
<td>Dueness fallacy</td>
<td>Red hit 6 times; so black is due. Hot streak fallacy: Red hit 6 times. I'm sticking with a winner</td>
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<tr>
<td>Faulty premise</td>
<td>One premise is wrong, so conclusion wrong. (A premise can be wrong but the conclusion OK)</td>
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<tr>
<td>True Scot fallacy.</td>
<td>Scot: No Scot would do such a thing. Cop: But it was a Scot. Scot: No true Scot would do it.</td>
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<tr>
<td>Circular reasoning</td>
<td>God exists as the Bible says so. &quot;All scripture is given by inspiration of God.&quot; 2 Timothy 3:16</td>
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<tr>
<td>Selective perception</td>
<td>Seeing only results that agree with you and ignore those that don't</td>
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<tr>
<td>Biased / small sample</td>
<td>Quoting only old people on the economics of the Social Security system.</td>
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<tr>
<td>Pseudo-question</td>
<td>Just because a string of words looks like a question doesn't mean it isn't meaningless.</td>
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<tr>
<td>Setting up a straw-man</td>
<td>Claiming X said something foolish that X didn't actually say, to discredit X.</td>
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<tr>
<td>Half truth</td>
<td>A statement that omits necessary facts. Yiddish proverb, &quot;A half truth is a whole lie&quot;</td>
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<tr>
<td>The Stolen Concept</td>
<td>All property is theft. The concept theft assumes while it denies the validity of concept property</td>
<td>-</td>
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<tr>
<td>Anthropomorphism</td>
<td>Attributing human characteristics or motives to something impersonal or irrational or an animal.</td>
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<tr>
<td>Quoting out of context</td>
<td>Movie reviewer, &quot;Not one of his best films.&quot; Ad in paper, &quot;One of his best films.&quot;</td>
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<tr>
<td>Misleading vividness</td>
<td>The plane crash yesterday killed 250 people. So, I'll drive.</td>
<td>-</td>
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<tr>
<td>Fallacy of the consequent</td>
<td>Women / slaves / serfs are inferior as they let men control them.</td>
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<tr>
<td>Two wrongs make a right</td>
<td>He took my pen, so I'll take his car.</td>
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<tr>
<td>Confusing cause and effect</td>
<td>X &amp; Y happened at the same time, so Y caused X. Maybe, but not necessarily</td>
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<tr>
<td>Post hoc ergo propter hoc</td>
<td>X happened before Y, so X caused Y. Maybe, but not always. Correlation is not causation.</td>
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<tr>
<td>Argument from omniscience</td>
<td>Everyone knows that Fords are better than Chevvy. (Appeal to Improper Authority)</td>
<td>-</td>
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<tr>
<td>False dilemma, limited choice.</td>
<td>Either God designed the world or it came about by chance. Missing choice, it evolved</td>
<td>-</td>
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<tr>
<td>Non-sequitur</td>
<td>It does not follow</td>
<td>-</td>
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<tr>
<td>Argument from averse consequences</td>
<td>She's blond, so she's dumb. (Many logical fallacies are non sequiturs)</td>
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<tr>
<td>Red herring, a fallacy of relevance</td>
<td>Asserting an irrelevant fact to divert interest from the relevant subject</td>
<td>-</td>
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<tr>
<td>False equivalence</td>
<td>Quoting opposing claims w/o analysis, inferring both are equally valid.</td>
<td>-</td>
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<tr>
<td>Begging the question</td>
<td>False unspoken premise: When will you stand up for America?</td>
<td>-</td>
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<tr>
<td>Appeal to improper authority/celebrity</td>
<td>Tom Cruise says gun control is un-American.</td>
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<tr>
<td>Argument from averse consequences</td>
<td>Find him guilty or others will do the same crime.</td>
<td>-</td>
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<tr>
<td>Slippery slope/camel's nose under the tent</td>
<td>You let one of those people in the neighborhood, They'll take over.</td>
<td>-</td>
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</tr>
<tr>
<td>Confirmation bias</td>
<td>Using / seeing only favorable evidence to support a pre-determined idea.</td>
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</tbody>
</table>
Words on pages 2-176 are indexed according to the year where that word is found, left margin, not by the page where that word appears.

Words in the Conclusions section, pp. 177-181 are indexed by the page they appear on.

Name Prefixes like "de, da, du, van, von," mean of or from or occasionally may denote nobility of some rank, inherited or awarded, and are mostly ignored in this index, as is the custom in most of the world (not the U S). Leonardo da Vinci means Leonardo from the village of Vinci. Thomas di Aquino means Thomas from the region of Aquino and so forth. This index uses the name that the person is best known by.

Johann von Goethe’s family name was Goethe but he was given the distinction of von Goethe after he became famous. He is commonly known as Goethe.

Some words appear so often that indexing them is not useful.

Index and Glossary

Achilles, hero of the Iliad, fought King Agamemnon, 9th century BC
Act of Toleration in England, 1689, granted certain rights to non-Anglicans, but not to Catholics or non-Trinitarians (i.e., one who doesn’t believe in the Trinity), atheists, and Dissenters. 1689
Acton, Lord, John Edward E Dahlberg, Catholic, fought the concept of papal infallibility in 1870, “Power tends to corrupt” 1862, 1870, 1887
Acute angle, any angle less than 90 degrees. An obtuse angle is greater than 90 degrees.
Ad abolendam, Pope Lucius’s Bull authorizing bishops’ inquisitions to fight heresies, 1184
Ad extirpanda, 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. 1776
Adams, John, third president 1809, revolutionary, 1624-deist, 1739-Hume, 171776-Age of Paine-Abigail, 1779-property, 178- Muslims, 1789-deist
Adams, Samuel, American revolutionary, 1773, 1789
Addison, John (1672-1719), essayist, poet, p. 179 index
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 new player to ceremony worshiping god of wine, The Persians 472 BC, first extant historical play, about the Greek defeating the Persians. c500 BC
Aesthetics, deals with the nature of art, beauty, and other sensual experiences. 425 BC, 1273
Aeterni Patris, Pope Leo 13, 1885
Afghan Constitution, Faith-based Evil p. 187
Al Afghani Sayyid Jamal al-din, Muslim reformer, The Refutation of the Materialists 1859, 1882, 1886
Against Method, Paul Feyerabend, 1975
Agamas, Jain astronomer. Universe is uncreated, has existed from eternity. Astronomy Timeline, p. 182
Agamemnon, King in The Iliad, c9th century BC
Age of Pericles, The, 430-404 BC. 431 BC
Age of Reason, The, Thomas Paine, an attack on religion, 1793 and 1795
Age of the Holy Spirit, The, Joacim of Fiore, 1200
Agnostic / agnosticism, coined by Thomas Huxley 1860, one who believes that one cannot know if a particular proposition is true, such as the existence of a god. This belief is based on Empiricism, i.e., that one cannot believe/ know something without sufficient evidence, 399 BC-Socrates, 1751-Hume, 1869-Thomas Huxley, 1871, 1873-Leslie Stephen, 1893, 1912-Russell, 1925-Clarence Darrow.
Agrarian Justice, Thomas Paine, 1779, 1797
Ahab, Israelite king, 900 BC
Ahura-Mazda, Zoroastrian god c600 BC
Aikenhead, Thomas, Scot student, dissed Jesus, so Presbyterians killed him. 1696
Airplane, a powered glider, Wright brothers, 1903
Aisha, Muhammad’s last wife, 624
Akbar, Book of, Abul Fazi, Sufism, 1589
Allen, Joel, Within a species, those with smaller appendages (tails, ears, limbs), in colder climes, are more likely to survive and reproduce, as a smaller surface area reduces heat loss, 1877
Alaric, Visigoth chief, sacked Rome, bought off, 410
Alberti, Leon, perspective in art 1430
Albertus Magnus, important 13th century philosopher, taught Aquinas, 1200, 1217, c1269, 1331, 1687-Newton,
Alchemist, alchemy, belief that one or more elements can be made into gold, 910, 1000, 1317, 1580, 1661, 1687-Newton, 1782, 1919
Alcmeneon, Pythagorean pathologist c480 BC
d’Alembert, Jean Baptist le Rond, co-founded the Encyclopédie, a philosophe, 1751,
Alexander 3, pope, corrupt, 1158,
Alexander 4, pope, 1200
Alexander 5, pope, Rodrigo Borgia, gave church land to his children, 1493-4, 1500, 1536,
Alexander 7, pope, 1657
Alexander the Great, Macedonian, tutored by Aristotle, conquered the three largest Western civilizations, 335-4 BC, 300 BC
Alexandria, intellectual capital of the West after Athens, library, museum, 330 BC, AD 150, 400, 415, 549, 642, 1440
Alexandria Library, 330 BC, 270 BC, 140 BC
Alexis, oldest son of and killed by, Peter the Great, 1703
Alfonso, king of Naples, saved Lorenzo Valla, 1440
Algebra, branch of mathematics whose principal concern is the study of formal systems, such as groups and fields which generalize various aspects of ordinary arithmetic. Math with unknown numbers represented by letters, 825, 850, 1085, 1202, 1430, 1637, 1683, 1796, 1912, 1925
Ali Qushji, presented empirical evidence the Earth rotates 1450, Astronomy Timeline p. 182
Allegory of the cave, Plato, 387 BC
Allegory, description of a subject under the guise of a description of another subject
Allotrope, an element with more than one natural form like carbon, charcoal or diamond.
Alloy, a substance formed by the combination of two or more elements, at least one of which is a metal.
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, The Origin of Chemical Elements 1948, supported the Big Bang model of the universe over the Steady State model, 1948, 1964
Althusius, Johannes monarchach (people rule), concept of the nation-state, 1609
Ambrose, Saint, bishop of Milan. 374
Amenhotep, pharaoh, first known monotheist, husband of Nefertiti, 1370 BC
America, numerous mentions starting from 1492
American Revolution, led by propertied men of the Enlightenment, 1775-1781
Ammianus Marcellinus, Roman, described 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.” 385
Amontons, Guillaume, first noticed that a higher temperature caused air to expand. c1700
Ampere, Andre, electrodynamics, a magnetic field is proportional to the electric current. 1785-1840 Electromagnetic Timeline, p. 123
Anabaptists, those who baptize more than once, a nice clean Christian sect, persecuted by popes, 1517
Anacleetus 2 / Petrus Leonas, pope 1139
Analects, Confucius’s writings, 1300 BC, 530 BC
Analogy-use of a simple well known concept to explain a more complex concept. Some analogies are similes & some are metaphors. A simile compares two things using the words “as” or “like.” Metaphors compare two unlike things that have something in common. Example, “He’s a diamond in the rough.” Shakespeare used analogies extensively. See at 1589.
Analytic geometry, idea that graphs and equations are two ways of depicting the same concept. 1637- Descartes
Analytic philosophy, the philosophical approach following from the empiricism of Locke and Hume, which emphasizes logic, attention to language and simplicity of argument, and seeks to clarify concepts, theories, ideas, and methods. It is distinct from the metaphysical speculation and system building of continental philosophy.
Anarchism, doctrine that no government is best as a government is Man’s enemy, 1845, 1881-Bakunin, 1911, 1924
Anatomy / physiology, the science of the structure of animals, including humans, 335 BC-Aristotle, 1486, 1543, 1555, 1603, 1661, 1770s, 1900
Anaxagoras, teleological argument, mind separate from matter 450 BC, 1273-Aquinas, 1637-Descartes
Anaximander, posited a concept of evolution, and advocated the principle of sufficient reason. 620 BC, 590 BC, 504 BC, 450 BC, 1859
Anaximenes, rainbows are caused naturally, 620 BC, 540 BC
Andromeda Galaxy, closest galaxy, to the Milky Way, It is approaching the Milky Way at 62-87 miles per second. It was first noted c964 by al-Sufi as a "little cloud" in the Milky Way’s Andromeda Constellation. 964, 1912, 1924, 1968, 1970s, 2004.
Angkor Wat, largest temple, Cambodia, 879
Anglican, Christian sect which evolved from the Roman Christian Church in England after 1533, when Henry 8 took control. 1516, 1532, 1579, 1600, 1611, 1650, 1661, 1685, 1687-Newton, 1689, 1710, 1726, 1754, 1798, 1829, 1832, 1854, 1859-60. 1864-5, 1873, 1963
Animism, in philosophy, the view that apparently inanimate objects like mountains or streams are in fact animated and activated by souls or spirits.
Anselm, St, Ontological Argument, the idea of a perfect God proves God exists, 1076, 1122, 1150, 1273, 1644, 1681, 1819, p. 178
Anthony, Susan B, American feminist, suffragette, 1875

Anthrupic Principle, The universe was made for Man, See God, arguments for, this Index, 1961, 1973

Anthropology, the study of Man, especially in particular cultures and societies, 1651-Hobbes, 1858-Virchow, 1887-Boas

Anthropogenic, belief that "God" was devised by Man. Anthropomorphism, tendency to impute human characteristics to animals

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

Antiochus 4, ruled Syria, persecuted Jews, c168 BC

Antony/Anthony, Mark, Roman senator, last consort of Cleopatra, conspired to kill Julius Caesar, 44-3 BC

Apatheism, the belief that questions of God's existence are of little or no practical importance.

Ape or bishop?, Thomas Huxley-Bishop Samuel Wilberforce encounter on Darwinism. 1860

Aphrodite, Greek goddess of love, beauty, pleasure, 750 BC

Apocalypticism: Belief in apocalyptic prophecies, especially regarding the imminent destruction of the world and the foundation of a new world order as a result of the triumph of good over evil.

Apollo, Greek god of healing, 750 BC

Apollonius, mathematician, 300 BC

Apologetics, an argument for a belief, not an apology, 1888

Apostle: "One who is sent out"


Arabic numerals, created by Indians, brought to Europe by Arabs, simplified math, c499, c711, 1201, 1545

Arago, Dominique, Electromagnetism Timeline, p. 123

Aramaic, language that was the international trade language of the ancient Middle East. Originated in what is modern-day Syria, between 1000 & 600 BC

Arbues, Pedro, Spanish, Let the Jew be fried, 1492

Archimedian 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, c1000, c1455, 1612

Argoll, a "variable" star whose brightness varies, 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, 325

Aristarchus, Earth orbits Sun & revolves, 270 BC, 1514, Aristocracy, rule by “noblemen” aristocracy

Aristocracy of merit, rule by the most competent.


Philoponus corrected two Aristotle ideas, 850-
al-Sabi rejected Aristotle's purpose in nature, 910-


Aristotle's four causes in science: material, formal, efficient, and final, 335 BC

Arius, leader of Arians, AD 325

Arjuna, Hindu prince in the Bhagdad Gita, 400 BC

Arnauld, Antoine, The Art of Thinking, 1650

Arnauld, Cisterian abbot, slaughtered Cathars, 1208

Art of Love, The, Ovid cAD 8

Aristotle, Greek goddess of the hunt, 750 BC

US Articles of Confederation, established a weak federal government, 1781

Artificial selection / eugenics, selective breeding to improve a species, 1859, 1899

Aryabhata, Hindu polymath, calculated pi, 499

Ash Shirazi, Qutb al-Din, astronomer, optics, 1250, 1302

Ashurbanipal, 2400 BC, 586

Ask and ye shall receive, Jesus' unequivocal promise to give believers what they ask for, AD 200, 1517

Asoka, great emperor of India, 325 BC

Astrolobe, device measuring angle of stars above the horizon, determines latitude, 846, 910, 1000, 1060, 1085, 1150, 1419, 1450, 1761, Astrolobe, son of Abelard and Heloise, 1122
Astrology, silly theory that position of planets at one's birth determines or at least influences one's characteristics, 300 BC, 150, 1000, 1273
Astronomical unit / AU, distance from Earth to the Sun, averages c93 million miles.
Astronomy: the study of the heavens, the oldest exact science, see Astronomy Timeline, p. 182, plus numerous mentions herein.
Atahuallpa, emperor of the Incas, Pizarro killed him, 1532
Athena, goddess of wisdom, courage, justice, 750 BC
Atom/Atomic Theory / atomism: theory that an atom is the smallest unit of a chemical. Theory is that atoms are the basic building blocks of all matter. A chemical in turn can be one element, i.e., copper, or a compound of two or more elements, like water, H2O (two hydrogen atoms and one oxygen atom. 2 gasses chemically combine to form a liquid). In the 1900s scientists learned that atoms were composed of smaller particles, namely protons, neutrons, electrons, and tinier bits. Leucippus and Democritus formulated the theory although it was not proved for c2,000 years, 450 BC, 430 BC, 425 BC, 335 BC Aristotle, 300 BC, 58 BC, 1473, 1631, 1666, 1673, 1808, 1812, 1819, 1826, 1847, 1860, 1869, 1875, 1877, 1882, 1897, 1899-1900, 1905, 1911-3, 1919, 1925-7, 1932, 1934, 1939, 1948, 1950, 1973, 1983, 2006, Atomic bomb, nuclear fusion or fission, Harry Truman: "An atomic bomb is the harnessing of the basic power of the universe." 1939
Atomic number: The number of protons in an atom, determines what element it is. 1869, 1913, 1914
Atomic weight, sum of protons, neutrons, electrons and tinier particles in an atom. Some elements like carbon & uranium have "isotopes" i.e., different numbers of neutrons, thus different atomic weights for same element. 1819, 1860, 1869, 1914
Atilla the Hun, 475
Atis, resurrection religion god, 2400 BC
Augustine, St, Doctor of the Church, Confessions, City of God, Free choice of the Will. He applied Original Sin to babies, 300 BC-Problem of Evil, AD 150-literal reading, 355-said many sects, 413-
Problem of Evil, City of God, Original Sin, rationality a threat to Christianity, Cogito, ergo sum, Julian and Pelagius disputed him, slavery OK, Universals, predestination, no wives for priests, men rule women, Bible accommodated to unlettered audience, demons cause disease, Earth is not a sphere, Omnipotence paradoxes, 476-City of God, 787-universe is static, 1076-Anselm, 1209-Aristotle's logic strong, 1269-Aquinas greatest since Aristotle, 1632-Augustine's two cities become Earth and heaven,
Augustus / Augustinian Age, Golden Age of Roman literature, culture. 150 BC
Averroës, I bn Rushd, pre-eminent Muslim scientist, scholar, Intro, 1000, 1150, 1160, 1217, 1277, 1331, 1687-Newton, 1714, 1719
Avicenna / Abu Alf Ibn Sina, physician, mathematician, Book of Healing, Canon of Medicine, 1000, 1085, 1150, 1225, 1225, 1527, 1590, 1687-Newton, Avogadro, Romano Amadeo, Atoms combine to form molecules, all gas atoms and molecules are the same size. Only accepted after he died. 1860
Aztec civilization, Mexico, Intro, 600 BC, 2000 BC, 250, 476, 1500, 1519, 1532
Baryon, an elementary particle made up of 3 quarks
Baryonic matter, protons, neutrons, and electrons
Basic laws of thought, Aristotle, 335 BC, 1160, 1748, 1751, 1819, 1905
Basil, Saint, bishop of Caesarea, 370
Battery, electric, Allesandro Volta, 1800, 1877
Bayle, Pierre, French philosopher, wrote *Historical and Critical Dictionary* in 1696, to "destroy the vices of religion." p. 1, 1680, 1685, 1696, 1700
Beard, Charles, *An Economic Interpretation of the Constitution of the United States*, caused historians to consider the economic interests and motives of leaders of societies, 1913
de Beauvoir, Simone, existentialist, 1973, p. 177
Bebel, August, critical of Christianity, 1881
Beccaria, Cesare, criminologist, *Crimes and Punishments*, 1764
Becker, Carl, historian, a founder of the "progressive" school of history, 1909, 1913
Beckert, Sven & Beckert, Michael Schermer 2011
Becquerel, Alexandre, photoelectric effect, 1839, 1785-1840 *Electromagnetism Timeline*, p. 123
Becquerel, Antoine, radiation, 1896
Bede, The Venerable, English monk, 731
Behaim, Martin, made first terrestrial globe in 1492; it did not depict the Americas, 1492
Behaviorism, the view that all animal and human behavior is a result of responding to stimuli, 1913
*Being and Time / Zeit und Sein*, Martin Heidegger, 1927
Bel, Alexander Graham, Edinburgh University, 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, opposed enslaving converts, 1492
Benedict, St, founded Benedictines, 520
Bentham, Jeremy, Introduction to the *Principles of Morals and Legislation*, utilitarianism, 1789, 1859
*Beowulf*, English national epic, written c900, 1200
Bergson, Henri, French popular philosopher, posited the concept of an *elan vital*, 1907
Berkeley, George, *Esse est percepi*, To be is to be perceived, His *Passive Obedience* said rebellion, even against a tyrant, was contrary to God's will. 1633, 1710, 1781,
Berliner, Emile, improved Bell's telephone, in 1878, became Bell's chief engineer, *Timeline*, p. 136
Bernard, Abbot of Clairvaux, persecuted Abelard, c1000, c1140, 1146
Barnes, Lee, Tim, almost single-handedly invented the World-wide Web, enabling the rise of modern science, 1988
Barnes, Lee, Tim, almost single-handedly invented the World-wide Web, enabling the rise of modern science, 1988
Bernoulli, Daniel, physicist, 1738, *Bernoulli's Principle*, in a steady flow of an incompressible liquid through a conduit of variable cross-section, the total energy of its unit volume is a constant magnitude, i.e., the pressure of a fluid decreases as it goes faster, 1738
Bessel, Friedrich, 1838, measured distance to a star using parallax, 1838
Beta decay, Pierre and Marie Curie, 1896
Bethe, Hans, physicist, two hydrogen atoms in the Sun fuse to become helium (fusion), lose a tiny bit of matter / energy, which is sunlight, 1936, 1938
*Beyond Good and Evil*, Nietzsche, 1886
*Bhagavad Gita*, Hindu holy scripture, 400 BC
*Bible, The*, the holy scriptures of Christians (includes *The Hebrew Bible/Old Testament*). Twain: "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. There are many versions. Luther had his own. Numerous mentions herein.
Bierce, Ambrose, *Devil's Dictionary*, heathen: "A benighted creature who has the folly to worship something he can see and feel," 1898
*Big Bang / Dynamic Evolving model* of the universe, formulated by Lemaitre in 1927. The universe began with an explosion from a singular point c13.8 Byears ago. Elementary particles and antiparticles were created within a fraction of a second after the explosion, followed by photons of radiation. In the next minutes, deuterium and helium nuclei formed, next hydrogen atoms when the temperature had dropped sufficiently. Then, matter became decoupled from radiation, and interacted to form stars and galaxies resulting in a further cooling to the present observed temperatures. 1927, 1050, 1953, 1961, 1964, 1992
*Bill of Rights, U S*, principal author, James Madison, ratified in 1791 as the first 10 Amendments to the *Constitution*, 1789
Biodynamics, the study of the motions of bodies and the forces acting on them.
Biology, the science of physical life, cells are the basis of living things, 800 MBC, 600 MBC, 7M BC, 330 K, 1783, 1799, 1916, 2014
*Birth / Bubonic Plague*, ravaged world, 1347-1349
Black hole, a region in space whose gravitational pull is so strong that it attracts and engulfs all matter including all electromagnetic waves, which includes light; first theorized in 1783 by Michell. First called black hole in 1967 by John Wheeler, 1783, 1799, 1916, *Astronomy Timeline* p. 182
Black, Joseph, isolated CO2, said air is a mixture of gasses, c1755, 1795
Blackburn, Simon, atheist, Cambridge, One man's revelation is another man's heresy, *Think*, 1748, p. 178

Blacks / Negroes, 540 BC, 1765, 1830, 1870, 1978

Blackstone, William, Sir, Brit. Jurist, 1759, 1776

Blasphemy; speaking of a god or God in an impious manner. *The Bible* proclaims death for blasphemers. Although Muslims today are the most violently oppressors of blasphemers. Laws against blasphemy are widespread. Ingersoll on state blasphemy laws: An infinite God ought to be able to defend himself, without the help of state legislatures. Almost half the countries of the world have laws against blasphemy or denigrating a religion

Blood, 35K BC, 335 BC-Aristotle, 476, 1150, 1242, 1553, 1555, 1603, 1628, 1661, 1673, 1864, 1901

Blue-shift, the visible portion of the electromagnetic spectrum (light) of a star or galaxy appears bluer to a viewer when the star or galaxy is approaching the viewer as the electromagnetic light waves are compressed into higher frequencies and the blue wave lengths of light have a higher frequency than the red waves at the other end of light waves in the electromagnetic spectrum. 1912, 1917

Board of Longitude, British, 1714

Boas, Franz, father of anthropology, 1887, 1907

Boccaccio, Giovanni, *Decameron*, 1352, 1454, 1512

Bodin, Jean, state sovereignty, 1586, 1609

Boethius, "As far as possible, join faith to reason," 520


Boiling point, temperature where the vapor pressure of a liquid reaches that of the surrounding gas or vapor. The liquid then becomes a gas.

Boleyn, Anne, 2nd wife of Henry 8. He killed her, 1533

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 age of matter, 1907

Boltzmann, Ludwig, entropy, thermodynamics, 1877

Bonaparte, Napoleon, 1532, 1793, 1795, 1799, 1808, 1815

Bond, in chemistry, a chemical link between elements, 1939


*Bonfire of the vanities*, Savonarola burnt books & other " unholy" items in Florence in 1494

Boniface 8, gave papal lands to his family, 1300

*Book of Animals*, al-Jahiz, 820,

*Book of Healing*, Avicenna, c1000

*Book of General Laws & Liberties of Massachusetts Colony*. It codified the *Old Testament*: 1. If any man...shall...worship any other god but the Lord God, he shall be put to death. 2. If any man or woman be a witch...death. 3. If any person shall blaspheme...death," 1648,

*Book of Mormon*, Joseph Smith, 1830

*Book of Plants*, al-Dinawari, c880

*Book of the Emerald*, Ibn al-Rawandi, ridiculed foolish Muslim beliefs. c870

Boorstin, Daniel, contemporary U.S. historian, 1473

Born, Max, physicist, a wave is a wave of probabilities, 1926

Bosseret, bishop of Meaux, against heliocentrism, 1702

Botany, the science of plants, 27K BC, 390 BC, 83, 880, 1085, 1483, 1486, 1694, 1768, 1779, 1832, 1838, 1860, 1900

Boulton, Matthew, ironmaster, 1765

*Le Bourgeois Gentilhomme* (1670), Moliere, 1664

Boyle, Robert, chemist, Irish, described the law of gasses, 1661, 1663, 1666, 1689, 1783, 1802

de Brabant, Siger, philosopher at the U. of Paris, led students of Averroes who had taught Aristotle without reference to the Christian God, argued that reason was more valid than revelation. So, he was forced to retire, 1277

Bracconini, Poggio, discovered Lucretius's *On the Nature of Things* in a monastery in 1473, so brought atheist classic to modern readers, 1473

Branden, Nathaniel, ideas are hierarchical; using an idea implies that one accepts its bases, 1964

Bradlaugh, Charles, atheist, Parliament refused to seat him as he wouldn't swear on the *Bible*, 1880

Bradley, James, calculated the speed of light, 1729

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, promotes the caste system to maintain their privileged status, 2000 BC, 600 BC, 528 BC, 25 BC, 150

*Brave New World*, Aldous Huxley, (Title taken from Shakespeare) 387 BC, 1532, 1932

Brooks, Mel, "It's good to be king."

Bodin, Jean, *De Republique*, state sovereignty 1586

*Brethren of the Common Life*, Dutch religious brotherhood, Erasmus attended, simple living, secular holy men, 1389, 1509

de Broglie, Louis, Matter (like electromagnetic waves) acts as waves and as particles 1924

*de Broglie wave*, in wave mechanics, a wave or wave group associated with a moving sub-atomic particle. 1924

Bronze Age, bronze is a copper/tin alloy, two soft metals make bronze, a hard metal, preceded The Iron Age, p. 1, 3000 BC, 1200 BC, 450 BC

Brown, Robert, botanist, Brownian motion, 1826, 1905

Brugnatelli, Luigi, electroplating, 1805

Bruno, Giordano, priest, *On the Infinite Universe and Worlds*, said the Earth may not be the center of the universe, burned at the stake, "Truth does not
change because it is, or is not, believed by a majority of the people.” 1576, 1600, 1633, 1644
Brutus, Roman senator, & others, killed Caesar, 44 BC
Bryan, William Jennings, Democratic candidate for president, believer, “One miracle is just as easy to believe as another.” 1925, 2011, p. 177
Bubonic plague, killed much of Europe, 1347
Buchanan, George, a leading Scot humanist, The Law of Government Among the Scots, 1579.
Power belongs to the people. When the ruler does not act in the people's interest, they have the right & duty to resist and kill him. (Locke later agreed.) Equality Timeline, p. 176
Buddhism / Buddhist, Indian atheistic ethical doctrine developed by Siddhartha Gautama 20K BC, 1300 BC, c528+, 350 BC, 45, 83, 100, 150, 604, 1060, 258, 1875, 1903, 1905
de Buffon, George le Clerc, evolutionist, 1749, 1859
Burbank, Luther, pre-eminent botanist, 1900
Burke, Edmund, father of modern conservatism,
"Superstition is a religion of feeble minds." A Vindication of Natural Society 1775, Reflections on the Revolution in France 1790, 1756, 1770, 1775, 1790, 1793, p. 181
al-Bukhari, Muhammad Sahih, compiler of hadith, 846
Bur, William, Self-Contradictions in the Bible, 1860
Burton, Robert, Anglican, skeptic, 1532
Butler, Joseph, Bishop, Sermons on Human Nature, 1724
C
Cabo, Giovanni, Venetian, & son Sebastian explored North America for Henry 7 of England. English form of his name is John Cabot. 1497
Caccini, Tommaso, Dominican, anti-Galileo, 1614
Calculus, any system of rules for symbolic manipulations, differential calculus is concerned with calculating the rates of change of functions, discovered by Newton and Leibniz at same time, 25, 1633, 1661, 1666, 1687-Newton, 1697, 1736, 1799
Caesar, Gaius Julius, 65 BC, 50 BC, 44 BC
Caiphas, Jewish high priest in Jerusalem, generally considered to have had a major part in having Jesus accused of blasphemy and crucified by Pontius Pilate. AD 30
Calendar, Jewish, 3671 BC;
Egyptian, 3500 BC, 3200 BC;
Babylonian, 3000 BC, 335 BC;
Julian, 50 BC, 1513, 1582
Islamic, 622
Christian, 731;
Aztec, 1519;
Gregorian, 1582
Caligula, Roman emperor, 1st century AD, 1493
Calixtus, corrupt pope, uncle of Pope Alexander 3, Callicles, The more able should rule, c370 BC
Calorie, the unit of heat in the CGS (centimeter, gram, second) system
Calvin, John/ Jean Cauvin, founded Calvinism, rejected all doctrines not found in the Bible, developed the concept that one's fate, Heaven or Hell, is predestined, wrote Institutes of Christian Religion. He ruled Geneva, strict, 1530s-1560, 1525, 1536, 1553, 1560, 1572, 1748, 1918
Camerarius, Rudolph, Epistola de Sexu Plantarum said plants reproduced sexually, 1694
Campbell, Joseph, The Power of Myth. 1943
Candide, Voltaire, satirized Leibniz, 1759
Cannizzaro, Stanislao, chemist, caused Avogadro's Law (All gas molecules are the same size) to be generally accepted in 1860, 50 years after it was discovered by Avogadro, 1860
Capella, Martianus, Carthage Proconsul, 7 liberal arts, rhetoric, grammar, astronomy, argument, geometry, music, arithmetic, c410
Capitalism, economic theory based on private property and free enterprise wherein one's station in society is measured by one's wealth.
Carbon, the basic element in all organic compounds.
Carlyle, Thomas, Rector, U. of Edinburgh. The three great elements of modern civilization are gunpowder, printing, and the Protestant religion. Ridiculed the Koran, 1840
Carneades, skeptic, head of Plato's academy, 150 BC
Carnegie, Andrew, U S steel baron & philanthropist. The man who dies rich dies disgraced.
Carnot, Sadi, founded therodynamics 1824, 1847
Carson, Johnny, Carson's Axiom regarding the success of a comedy sketch (or most any argument), "You buy the premise, you buy the bit." 1779.
Carter, Brandon, Anthropic Principle, 1973
Cartesian, pertaining to Descartes. Cartesian dualism refers to Descartes's separation of mind and body, 1637, 1670, 1687-Newton, 1710
Carvakas, adherents of Lokayata, an ancient Indian atheistic doctrine, 620 BC, 600 BC
Cassini, Giovanni, director of the Paris Observatory, accepted heliocentrism, 1672, 1676
Cassius, Roman senator, 44 BC
Caste system, odious Hindu belief that one's position in life is due to one's conduct in previous life. promoted by the ruling Brahmins: Gandhi and Nehru rejected it. 2000 BC, 620 BC, 528 BC, 1532, 1800, 1875, 1932, 1947
Castelli, student of Galileo, 1613
de Castelnau, Pierre, emissary of Pope Innocent 3 to the Cathars. 1208
Categorical imperative, (categorical, that which is without exception or qualification absolute & certain), Kant’s refinement of the Golden Rule, 1788
Cathars, peaceful Christian sect disdaining necessity for clergy, so wiped out by Pope Innocent 3, 1147, 1184, 1198, 1208,
Catherine de Medici, instructed her son, the child king of France, to kill Huguenots / Protestants, 1572
Catherine the Great, Russian empress / czarina, 1733
Catherine, first wife of Henry 8, Marriage voided, 1533
Catherine Howard, 5th wife of Henry 8. 1533
Catholic / Catholicism, see Roman Catholic
Cato the Censor, Roman statesman, severe, 200 BC
Caution Criminalis, by Frederick Spee, Jesuit, condemned witch hunts, 1631
Cave paintings, first known "writings," 30K BC, 18K BC, 3500 BC
Cavendish, Henry, isolated hydrogen 1766
Cayley, George, Brit. aerodynamics, flew a manned kite, 1853
Cepheids, a variable star, it pulsates radially, varying in both temperature and diameter to produce brightness changes with a well-defined stable period. 1914
Cell: the smallest independent part of a biological organism, made up of millions of atoms.
Cell Theory, all tissues and organs, including the nervous system, are cellular in structure, cell theory is the basis of biology, 1665, 1860
Cellular Pathology, Rudolf Virchow, 1858
Celsius/ Centigrade, measure of temperature, $1C = 1.8$ Fahrenheit degrees, 1802, 1846, 1860
Centrifugal force = inertia. the force which a mass, constrained to move in a circle exerts on the constraint in the direction along the radius. 440 BC, 1656, 1683, 1970,
Centripetal force = gravity
de Cervantes, Miguel, Don Quixote, an anti-hero (a hero with no "heroic" attributes), 1605
Chadwick, James, discovered neutrons 1932
Chain of being, 387 BC, 780, 1317, 1624, 1709, 1775, 1766, 1775, 1783, 1840, 1869, 1900, 1934-5, 1939, 1953
Chemical Bond, The Nature of the, Linus Pauling, most cited science text, 1939
Chemistry, 780, 1317, 1624, 1661, 1709, 1775, 1766, 1775, 1783, 1840, 1869, 1900, 1934-5, 1939, 1953
Charge, (electricity) the amount of unbalanced electricity in a system, either positive or negative
Charlemagne, emperor of the Holy Roman Empire, illiterate, he collected scholars; unsophisticated, he established a legal system; not religious, he controlled the clergy. 800 AD
Charles 1, English king, beheaded by Cromwell, 1649
Charles 5, Holy Roman Emperor, Diet of Worms, 1517
Charles 9, French child king, at 12, ordered killing tens of thousands of Huguenots at the command of his mother, Catherine de Medici, St. Bartholomew's Day Massacre, 1572
Charles, Jacques, Heat expands gasses, 1787
Charron, Pierre, priest, skeptic, The Three Truths, De la Sargesse, 1594, 1601
du Chatelet, Emilie, French noblewoman, scientist and patron of scientists, mistress of Voltaire, 1730s
Chemical bond, the chemical link between atoms
Chemical Bond, The Nature of the, Linus Pauling, most cited science text, 1939
Chemistry, 780, 1317, 1624, 1661, 1709, 1775, 1766, 1775, 1783, 1840, 1869, 1900, 1934-5, 1939, 1953
Circular inch, a circle 1 inch in diameter. Its area is $.7854$ of a 1 inch square

Cheops, Egyptian pharaoh, Great Pyramid of Cheops 3rd century BC
Chibisov, G. V., quantum fluctuations 1981, China/Chinese, 70+ mentions from 700K BC
Cholera, disease spread by impure water, 1519, 1854
Chosen people, a delusion by held by Jews, Christians (Colossians 3:12, John 15:16, 1 Peter 2:9), Mormons, Rastafari, Jehovah's Witnesses, Seventh Day Adventists, and the Unification Church, that God favors such believer's religion over others. Calvinists talk about "God's elect."
Chou Dynasty, 530 BC
Christian / Christianity, group of sects/religions that worship Jesus Christ as God. The Western part of Christianity separated from the Eastern part centered in Constantinople in 1054. The ascendancy of the Rome-centered Christian Church in world influence has been due to Europe and The Americas' political growth compared to the Eastern part. Time's Almanac 2000 reported 29 Christian sects each with over 500,000 adherents, 3000 smaller ones, including the two largest Christian churches, Eastern Orthodox and Roman Catholic, who have different dogmas. (Roman Catholic Jesus's beliefs differ from Roman Catholic Opus Dei's.) Numerous Christian sects with differing beliefs developed from the beginning and thousands more subsequently. Several Christian Protestant sects were founded in the 16th century by splitting off from the Western Christian church based in Rome. All Christian sects profess to be the true church of Jesus Christ. Christianity has lesser beings with limited supernatural powers, such as Mary, Satan, and the saints. Emerson: Religions we call false were once true. W Liebeschuetz: Asceticism and intolerance are the two main contributions Christianity made to European culture. Over 400 mentions herein.
Christianity as Old as Creation, Matthew Tindal, 1730
Christianity Unveiled, Baron d'Holbach, 1761
Christophorourus, Vatican official, forged the Donation of Constantine in 735
Chrysostom, John, patriarch in Constantinople, hated Jews, venerated by Hitler and other anti-Semites, 400, 1925
Cicero, Marcus, Tillius, Roman Consul, statesman, Prolific letter writer. De Natura Deorum, "The immortal gods seem to have been fabricated for human use." 300 BC, 65 BC, 44 BC, 1339, 1345, 1397, 1580,
Cigni, a star, 1838, Astronomy Timeline p. 182
Circuit, a path through a circuit, 1833
Clocks, a device for measuring time, 1625, 1662, 1700, 1825, 1829, 1833, 1860, 1870, 1875, 1900, 1913, 1925, 1975, 1990, 2000
Clocks, a device for measuring time, 1625, 1662, 1700, 1825, 1829, 1833, 1860, 1870, 1875, 1900, 1913, 1925, 1975, 1990, 2000, 2013
City of God, Augustine, 1413-27
Clairaut, Alexis, astronomer, 1687
Clark, Kenneth C, historian, 1397
Clarke, Arthur C, anthropologist. "The rash assertion that God made man in his own image is ticking like a time bomb at the foundations of many faiths, and as the hierarchy of the universe is exposed to us, we may have to recognize this chilling truth; if there are any gods whose chief concern is man, they cannot be very important gods." 8000 BC
Claudio, Rudolph, 2nd law of thermodynamics, 1847, 1877
Clavius, Christopher, astronomer, 1611
Cleisthenes, Athenian ruler, promoted democracy, 508 BC
Clemens, Samuel, real name of Mark Twain, 1870
Clement 2, Pope, appointed pope by HR emperor Henry 3, 1046
Clement 4, Pope / Cardinal de Foulkes, 1267
Clement 5, Pope, falsely accused Knights Templar, stole their property 1306
Clement 7, Pope / Robert of Geneva (considered an anti-pope), 1387
Clement 7, Pope, (Giulio de Medici) (1478-1534), natural son of Giuliano de Medici, raised by Lorenzo the Magnificent de Medici, 1533
Clement 8, burned Giordano Bruno at the stake, 1600
Cleopatra 7, killed her brother to become sole ruler of Egypt, consort of Mark Anthony and Gaius Julius, Caesar/dictator of Rome. 44 BC
Clergy’s historical fear of ideas, p.179, p. 180
Clergy “protecting their turf” best explains their actions persecuting “heretics.” 1562, p.181
Clerk-Maxwell, James, likely the third most prominent physicist of all time, after Einstein & Newton. Treatise on Electricity and Magnetism. Maxwell’s Equations unified the forms of energy, light, electricity, and magnetism frequencies of the electromagnetic spectrum. With Faraday, he discovered the phenomenon of fields of force. Such fields of force can act across a vacuum. (Gravity is the 4th force to act across a vacuum), 1859, 1855, 1860-97 Electromagnetism Timeline, p. 135, 1879, 1900
Clock, c500 BC, 1000, 1300, 1590, 1633, 1655-6, 1761
Closing of the Western Mind, Charles Freeman, 410
Clovis, Frankish king, Christian, 500
Code of Manu, The, Hindu, c400 BC
Cognition, the forms of knowing and perceiving, such as attention, memory, reasoning, and perceiving (visual, aural, tactical), through which we synthesize information.
Cognitive Dissonance / motivated reasoning / confirmation bias, the very strong tendency of people to hold on to a belief when confronted by facts refuting such belief. Leon Festinger, 1957,
Cohen, Morris, American philosopher, 1946
Colenso, John, Anglican bishop, correctly said the Pentateuch was self contradictory, so he was excommunicated, 1865
Coleridge, Samuel Taylor, author, p. 1
Colombo, Matteo, discovered blood circulation, 1555
Colon Cristobal / Christopher Columbus, 1405, 1492, 1497, 1539, 1563
Colonialism, rule of one country by another, p. 1, 1800
Columbian Exchange, 1539
Comet, ice and frozen CO2 object orbiting in the solar system. Long orbits. Halley’s comet, 76 years, 450 BC, 250 BC, 168 BC, 45, 1464, 1543, 1577, 1680, 1705, 1758, 1996
Commager, Henry Steele, American historian, 1954
Commentarius, Copernicus’s treatise on heliocentrism, 1514
Common Sense, most influential pamphlet in American history, Thomas Paine, 1776
Communist Manifesto, Karl Marx & Frederich Engels, “A Spectre is haunting Europe,” 1848
Compatibilism, the belief that determinism is compatible with free will, the position of Greek stoics, Hobbes, Hume. and Daniel Dennett. Critics admit that something may be compatible with determinism but that shouldn’t be considered free will, 413
Compendium Studii Philosophiae, Roger Bacon, condemned clerical ignorance, 1271
Complementarity principle. A principle in quantum mechanics by which an experiment on one part of a system of atomic dimensions is supposed to destroy the possibility of learning about a complementary aspect of the same system. Niels Bohr, 1933
Complementarity theory, (Bohr) The wave and particle aspects of nature complement rather than contradict one another. For example, an experiment to show the particle nature of electrons (like the photoelectric effect) will not show their wave nature.
Condition of the Working Class in England, The, Frederick Engel, 1845
Conduction: Heat or electricity transfer by means of molecular interaction, e.g.: heat passing along a metal bar, 1847, 1897
Conflict of the Faculties, Kant, 1789
Conservation of angular momentum, principle of, a fundamental of physical laws. If the resultant external torque on a system is zero, the angular momentum of a system stays constant.
Conservation of Energy, Law of, in a closed system, in the conversion of energy from one form to another, like light to heat, or vice versa, the total energy is constant, 1714, 1738, 1766, 1831, 1842, 1847, 1905
Conservation of Mass, law of, 1714, 1783, 1905
Conservation of Mass-Energy, law of, Einstein, 1714, 1783, 1905
Conservation of Momentum, Descartes, 1670, 1687
Conspicuous Consumption, Veblen, 1776, 1899
Constantine, Roman emperor, promoted Christianity, 83, 321, 325, 330, 337, 363, 392, 753, 787, 1440
Constantinople, first called Byzantium, then Nova Roma; on Constantine's death named Constantinople, in 1923 named Istanbul, Greatest Western city for c1000 years, 200 BC, 337, 381, 381, 400, 475, 529, 538, 591, 718, 726, 799, 932, 1000, 1054, 1150, 1300, 1400, 1453


Continental Rationalism, Reason, not experiment is the surest path to truth, Kant and others, 1633

Convection, Heat transfer through the movement of a fluid, e.g., warm air through a house, 1803, 1846

Cook, James, Captain, Brit., sailed around the world twice, 1768-71, then 1772-75, 1768

Cooke, William, with Charles Wheatstone, Brits, made a telegraph machine 1837

Cooper, Anthony Ashley / See Shaftesbury

Copernicus, Nicolas, Polish priest, astronomer, Commentarius 1514, On the Revolutions of the Heavenly Spheres, 1543, he revived and refined the concept of heliocentrism, which had been ignored for 2000 years, 270 BC, 1513-4, 1536, 1543, 1572, 576, 1582, 1589, 1609, 1613, 1616, 1633, 1644, 1687-Newton, 1758, 1835, 1900, 1962

Cortez, Hernan, Spanish, conquered Aztecs, 1519

Cosimo de Medici, 1450

Cosmic background microwave radiation, thermal radiation assumed to be left over from the Big Bang. It is the oldest light in the universe. Strong radio telescopes can detect it and is almost the same strength from all directions in the universe, and not associated with any star or galaxy. It is strong evidence of the Big Bang model of the universe, 1992

Cosmological Arguments for God aka First Cause Arguments, see God, arguments for, 335 BC-Aristotle, 230, 862, 1085, 1150, 1273, 1687-Newton, 1710, 1714, 1739, 1779, 1781, 1928-9

Cosmology / Astronomy Timeline of Knowledge and Beliefs regarding the Universe, p.182+
de Coulomb, Charles, experimented with electricity 1785, & 1791, 1860 Timeline p. 136

Council of Basel / Ferrara/Florence, 1431

Council of Constance, betrayed Hus, 1414

Council of Pisa, tried to resolve the Schism 1409

Council of Trent, no compromise with Protestantism, 1545-1563

Counter-Reformation, actions taken by the Roman Catholic Church to reform to stop the loss of subjects to the emerging Protestant Christian sects. 1545, 1686, 1700

Cranmer, Thomas, named Archbishop of Canterbury by King Henry 8 to legitimize Henry 8's wedding to Anne Boylen, Later murdered by Henry 8's daughter Mary (by Catherine 1), 1533

Creationism, belief that God created the universe and all species in their present form, about 6000 years ago, popular in the US (45% of Americans believe God created humans less than 10,000 years ago) and ridiculed by scientists. Ronald Numbers, an advocate for creationism, "There is a very large constituency of Americans who are quite comfortable with Young Earth Creationism." He is right. This attempts to validate a scientific proposition by citing the opinion of ignorant people. 1150, 1857, 1987

Crick, Francis, DNA 1953

Crisis, American, a Thomas Paine pamphlet, Dec. 1776

Critique of Judgment, Kant, 1790

Critique of Practical Reason, Kant, 1788

Critique of Pure Reason, Kant, 1781

Croce, Benedetto, educator, Italy's most important 20th century philosopher, Historical Materialism and the Economics of Karl Marx, 1920

Cro-Magnon Man, early Homo sapiens, 30,000 BC

Cromwell, Oliver, Brit. PM, beheaded Charles 1, massacred Irishmen, parliament ruled, 84, 92

Crusades, 1096-1272, stupid series of papal wars by Christians against Jews, Muslims, and Christian heretics, 1096, 1146, 1202, 1208, 1215, 1515, 1689

Crystal: Solid substance with a regular geometric arrangement of atoms.

Cullen, William, Scot, published the first modern pharmacopoeia. 1776

Cult, a purportedly religious group which uses psychological coercion to recruit, indoctrinate, and retain members to a greater degree than mainstream religions. Its beliefs are considered to be more bizarre than the beliefs of the speaker's religion. Re any and all supernatural beliefs, "One miracle is just as easy to believe as another." William Jennings Bryan

Cultural relativism, (Boas) All cultures are equally valid and must be understood on their own culture-specific terms. 1601

Culture: a group larger than a tribe with common beliefs, one definition says it is the transmission of learned behavior. Numerous mentions herein.

Curie, Pierre and Marie, physicists, discovered radioactivity in 1896

Curie, Marie, (1867-1934) Polish, only woman to be awarded two Nobel prizes. Einstein in 1911 wrote Marie Curie, a widow, urging her to ignore the bigots who were publicly criticizing her for having an affair and for being refused admission to the French Academy of Sciences, which admitted its first woman only in 1962, 1896

Curie, the unit of measurement of radioactivity.

Curtis, Heber, said nebulae are separate galaxies, 1917, 1920, 1924,

Cuvier, Georges, evolutionist, Note on the Species of Living and Fossil Elephants, 1796

Cynic, school of philosophy c340 BC

Cyrus, Persian king, Zoroastrian, c529 BC

Dalai Lama, chief Tibetan Buddhist lama, 2000

D
Dale, David, Scot, in 1786 established a cotton mill at New Lanark, Scotland that provided free housing and other then unheard of humane features. His son-in-law, Robert Owen, took over in 1800. 1805

Dalton, John, Atoms are the building blocks of all matter 1808, 1905

Damian, Peter, Cardinal, discovered every cleric in Milan was corrupt. 1059

Dante, Aligheri, Divine comedy 1310, 1000, 1217, 1310, 1400, 1512, 1514, 1517, p.179-the Index

Darby, Abraham, Brit. chemist, developed the blast furnace 1709

Darius 1, Persian, attacked Greece twice, 490 BC

Dark Ages, The: a theocracy In the West, government was feudal, not centralized, except for the religion, which governed peoples' thinking, the body of knowledge shrank, c450-c1000,

Dark energy, non-visible, unknown type of energy inferred to exist to explain why the galaxies in the universe are accelerating their expansion from the Big Bang. 1998, Astronomy Timeline p. 182+

Dark matter, non-visible, unknown type of matter with gravitational effect inferred to exist to explain why rotating galaxies don't fly apart due to centrifugal force given their calculated mass; first posited in 1933 by Zwicky but ignored. The most commonly accepted speculation as of 2014 is that dark matter consists of subatomic particles called WIMPs, p. 1, 1933, 1998, 2004, 2006,

Darrow, Clarence, greatest American lawyer, agnostic 1920s-1940s. 11,000 BC, 1532, 1925

Darwin, Erasmus, Charles Darwin's grandfather, noted evolutionist 1794, 1809, 1859, 1964,


Davy, Humphrey, chemist, discovered that an Electric current applied to chemicals could produce new chemicals, electrolysis. 1808

Dawkins, Richard, philosopher, atheist, The God Delusion, posited the concept of cultural evolution. One cannot prove that a god does or once did not exist but the absence of any evidence that there is a god permits one to assert to a "scientific certainty" but not absolute certainty that no God in the commonly accepted definition exists. Also, he posited the notion of an altruistic gene and a selfish gene, inferring that such traits were governed by one's genes and thus involuntary. 1532, 1973

Day-Age Theory, a theological interpretation of the account of creation in the Bible to reconcile what the Bible said about creation with scientific knowledge. It says the 6 days of creation in Genesis really meant 6 ages or epochs. Much theological scholarship attempts to reconcile the Bible with the world. 413

Dead Sea Scrolls, found 1947-1956 in caves NW of the Dead Sea. Some are fragments of the Old Testament, some concern possibly the Essenes. They are roughly contemporary with the writings of the New Testament. They tell much about John the Baptist, but not Jesus, 1947

Decameron, The, Boccaccio, 1532

Decimal system, Arabs brought to the West c1585, c136 BC, c711, c825, c1408, 1585

Declaration of Independence, U.S., Jefferson the principal author (with Adams, Franklin, Robert Livingston, & Roger Sherman) built on concepts of Locke, Paine, & Mason. Adams wanted "life, liberty, and the pursuit of happiness", rather than Locke's better known phrase, "life, liberty, and property". Certain basic human rights are self-evident & inalienable. Ninety towns & colonies had issued similar declarations. The Continental Congress reduced Jefferson's proposed draft by one fourth. It was published July 4th. 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 suspending penal laws enforcing conformity to the Church of England & allowing persons to worship in their homes or Chapels as they saw fit. 1687

Declaration of Rights, Stamp Act Congress, 1765

Declaration of Rights, First Continental Congress, 1775

Declaration of Rights, Virginia, George Mason, 1776

Declaration of Rights of Man, French, 1789

Decline and fall of the Roman Empire c400-c450

Decline and Fall of the Roman Empire, The, It defined the fields of comparative anthropology and sociology for 200 years. Edward Gibbon, 1776,

Deconstruction, Jacques Derrida, 1967


Defoe, Daniel, Robinson Crusoe, p. 179, the Index

Deism / deist, a religious philosophy, positing that the common beliefs of all religions infer a god and certain moral standards, but nothing beyond that, so a god created the universe and left it alone to evolve by laws of nature that the god established. 1624. 335 BC-Aristotle, 1273, 1624, 1686, 1730, 1733, 1739, 1751, 1758-9, 1776, 1783, 1789, 1799,

Democracy in America, Alexis de Tocqueville, 1835

Democracy, in most basic terms, the theory of rule of the people by majority vote. In modern times it includes the protection of certain rights of people
such as the US Bill of Rights against the "tyranny of the majority." Different democracies have different details. For legal scholar Ronald Dworkin rights are fundamental and give the law its moral framework. Rights don’t just limit majority, i.e., democratic, authority, they also explain where democratic authority comes from. Athenian "democracy" did not permit slaves, women or non-Athenian-born persons to vote. The concept also ranges from direct democracy where everyone votes (town meetings in New Hampshire) to representative democracy (the legislatures of the US federal and state governments). Democracy is the form of government most compatible with individual dignity, but usually still imperfect in practice. Woodrow Wilson: "The government, which was designed for the people, has gotten into the hands of their...employers, the special interests. An invisible empire has been set up above the forms of democracy." Edward Dowling, Jesuit priest: "The two greatest obstacles to democracy in the United States 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." p.1, 594 BC, 508 BC, 490 BC, 435 BC, 431-0 BC, 425 BC, 399 BC, 387 BC, 340 BC, 335 BC Aristotle, 910, 1324, 1651, 1689, 1776, 1787, 1790, 1835, 1848, 1863-4, 1869-71, 1899, 1933, 1938-9, 1941, 1998, 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 Derrida, Jacques, deconstruction 1967 Descartes, Rene, more or less founded modern philosophy, posited that mind and matter were separate (Cartesian dualism). Most famously known for saying, "Je pense, donc Je suis." I think, therefore I exist. He sought to establish a system of knowledge that rejected all incorrect authority of the Church and previous philosophy. He doubted the senses as they were fallible. He sought to build a rational philosophy rather than one based on one's senses, i.e., experience. p.1, 425 BC, 387 BC, 413, 1076, 1267, 1583, 1600, 1633, 1637, 1641, 1644, 1651, 1654, 1664, 1670, 1676, 1687-90, 1748, 1759, 1879, 1893, 1896 Descent of Man and Selection in Relation to Sex, 1871, Charles Darwin's 1859 Origin of Species had not mentioned humans in its discussion of natural selection. Descent confirmed Man descended from a previous primate, 1871 Design Argument, see God, arguments for, this Index Determinism, view that every event is the inevitable result of what has happened before, (see compatibilism, this index) 58 BC, 413, 1812 Devil's Dictionary, Ambrose Bierce, 1899 Dewey, John, American educator, philosopher, psychologist, social reformer, apply scientific knowledge to human affairs to reveal which values to enhance, 1917, Diagoras, an Athenian Sophist. 425 BC Dialectic, a theory of the nature of logic which is also a theory of the structure if the world, also the logic of reasoning which operates independently of experience and purports, incorrectly, to give knowledge of the transcendental order of things in themselves, c504 BC, c435 BC, 387 BC, 335 BC Aristotle, 1085, 1121-2, 1150, 1273, 1820s, 1883 Dialogue on the Two Chief Systems of the World, Galileo's defense of heliocentrism, caused him to be convicted by a court of cardinals of the Inquisition of "suspicion of heresy", 1632 Dialogues Concerning Natural Religion, Hume, inter alia, refuted the Design Argument, 1779 Dialogues Concerning Nature, Lucillo Vanini, 1619 Dicke, Robert, Anthropic Principle theorist, 1961 Dickens, Charles, Great Expectations, Tale of Two Cities, Hard Times (a protest against educators who think only of money) A Christmas Carol. Marx told Engels that Dickens had "issued to the world more political and social truths than have been uttered by all the professional politicians, publicists, and moralists put together." 1847 Dictator, one who rules without the consent of the governed, like a king or warlord, 65 BC Dictionary of the English Language, Samuel Johnson, standardized English spellings, 1755 Diderot, Denis, philosophe, founded the Encyclopedie Dictionnaire Raisonne des Sciences, des arts et de metiers 1751+, Fools have been and always will be the majority of mankind... Either faith is a chimera or reason is useless., d'Alembert's Dream, , 1670, 1700, 1751, 1761, 1830, Diet of Worms, convened by HRE Charles 5, called Martin Luther to appear, "Hier stehe Ich," 1521 Diffusion, the random movement of molecules in a system. Dignity of Man, Oration on the, humanism, Pico Della Mirandola, 1486, Equality timeline, pp.176, 179, 181 Dilemma, a choice between two or more unattractive alternatives. Al Dinawari, Book of Plants. 880 Dioctletian, Roman emperor before Constantine, severely punished Christians, retired to Split, AD 321 Diodorus Siculus, Greek historian, 1st century BC Diogenes, Greek, skeptic c340 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. 1532, 1927, 1930, 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, (It ridiculed the pope), 1638 Discourse on the Method of Rightly Conducting Reason and Seeking Truth in the Natural Philosophies, Descartes, "Je pense, donc, je suis," 1637
Disputation on the Power and Efficacy of Indulgences, (The 95 Theses) Martin Luther, started the Reformation 1517

Disraeli, Benjamin, Prime Minister, "A conservative Government is organized hypocrisy."

Dissertation Concerning Solids within Solids, Nicolas Steno, explained fossils, 1671

Divine Comedy Divina Commedia, Dante, 1310

DNA, Deoxyribonucleic acid. Spiral helical polymer chains, a double helix structure containing genes for all characteristics of an organism. 1953

Dogma, a term in any religion's theology meaning a doctrine claiming authority over any private opinion. It is held to be a religious truth established by divine revelation as interpreted by the clergy. Rejecting it is heretical, thus, in Christianity, a ticket to Hell.

Dominic / Dominicans, active in conducting inquisitions, 1150, 1198, 1200, 1215, 1217, 1223, 1247, 1269, 1307, 1478, 1484, 1494, 1515-6, 1519, 1543, 1576, 1614, 1633,

Don Juan, Wolfgang Amadeus Mozart, 1787, 1808

Don Quixote, Miguel de Cervantes, 1605

Donation of Constantine, Land Pepin gave to the Church based on a document forged by the Vatican & claimed to be written by Constantine, c753, proven a forgery, 1440

Donatists, very early Christian sect, 325

Doppler, Christian / Doppler effect, 1842, the apparent rise in the frequency of a sound wave from an approaching body as sound waves are bunched up. Opposite for receding bodies, 1842, 1868

Dostoyevsky, Fyodor, The Idiot, The Brothers Karamazov, The Grand Inquisitor, 1880

Draco, Greek law giver, harsh/draconian, 620 BC

Drake, Francis, Sir, successful English pirate, 1577

Draper, Henry, photographed spectra of Vega 1872

Draper, John William, The History of the Conflict Between Science and Religion. 1886

Dred Scott decision, US Supreme Court., Slaves are property, illustrates the political essence of US Supreme Court (viz Bush v. Gore 2000), 1857

Dreyfus, Captain Alfred., victim of French anti-Semitism. Vindicated by Zola's J'accuse, 1898

Drummond, Thomas, Property has duties as well as rights 1835

Drummond, Sir William, philosopher, 1628

Dualism, the theory that reality is made up of two fundamental and fundamentally different elements, as opposed to monism.

Dumas, Alexandre, père et fils, French, writers, p. 179

Duty to revolt, Locke, 1690, Buchanan, p.176

Dynamics, the study of masses and forces Dynamic Evolving Model of the universe. see Big Bang.

Dylan, Bob, songwriter, singer

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 to 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.

E

E=mc²: equivalence of and relationship of matter and energy, Einstein, 1905

Eanners, Dom Gil, Portuguese, captain in Prince Henry's school, first to sail south past Cape Bojador on the western coast of Africa, 1419

Earman, John, Anthropic Principle, WAP is a tautology, 1973

Earth is a magnet, de Magnete, Gilbert, 1600, Ebionism, early Christian sect, 325

Economics, 1776, 1798, 1800, 1848, 1929, 1936, 2013

Eddington, Arthur, Brit., showed Einstein's theory as to the bending of light rays due to gravity as more accurate than Newton's. Never accept a fact until it is verified by a theory. 1911, 1918-9, 1930, 1933

Edict of Nantes, French king Henry 4, Edict letting Protestants vote, 1589, revoked by Louis 14, 1685

Edinburgh and Glasgow, seats of the Scottish Enlightenment, Edinburgh Review, influential Enlightenment periodical, 1751

Edison, Thomas Alva, prolific inventor of electrical instruments / devices, 1877, 1883

Edmundson, Mark. His Self and Soul is a relentless scathing assault on the complacency and shallow egotism of Western man's modern soul, 2015

Edwards, Jonathan (1603-1658), American charismatic Protestant evangelist, led the first Great Awakening.

Efficiency, amount of work done compared to amount of work/energy used in a machine or engine.


Ehrman, Bart: God's Problem, How the Bible Fails to Answer Our most Important Question-Why We Suffer 2008, says that The Bible gives unpersuasive and incompatible answers. 2008


"Information is not knowledge. Understanding information is knowledge." p.1, 335 BC-Aristotle, 1583, 1613, 1664, 1714, 1783, 1796, 1826, 1860, 1886, 1900, 1905, 1907, 1912-5, 1918-9, 1922, 1924,
Elci, Italian Monsignor, anti-Galileo 1614

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, 1860, 1872, 1952

Electrodynamics of Moving Bodies, Einstein, 1905

Electric motor, 1821, 1823, 1831

Electromagnetic radiation, energy emitted by all objects with a temperature above absolute zero. 1865, 1900, 1905

Electromagnetic spectrum, all the possible forms of electromagnetic radiation, whose wave frequency varies from the microscopic to miles. Gamma rays are the most energetic (shortest wave length) waves to radio waves are the least energetic (longest wave length). 1800, 1842, 1865-6, 1924

Electromagnetism Timelines,
Years 1785-1840 at p. 123.
Years 1860-1897 at p. 136

Electromagnetic wave(s). Waves have both an electric and magnetic component. They are: radio, micro, infra-red, visible light, ultraviolet, X and gamma rays, 1842, 1848, 1864, 1866, 1888, 1895, 1868, 1905

Electromagnetism / electromagnetic force: one of the 4 fundamental interactions in nature, the other three being 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.

The science of electromagnetic phenomena is defined in terms of the electromagnetic force, which includes both electricity and magnetism as elements of one phenomenon.

Milliseconds after the Big Bang, the electroweak force split into the electromagnetic and weak force. The electromagnetic force plays a major role in determining the internal properties of most objects encountered in daily life. Ordinary matter takes its form as a result of intermolecular forces between individual molecules in matter. Electrons are bound by electromagnetic wave mechanics into orbitals around atomic nuclei to form atoms, which are the building blocks of molecules. This governs the processes involved in chemistry, which arise from interactions between the electrons of neighboring atoms, which are in turn determined by the interaction between electromagnetic force & the momentum of the electrons. 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 electro-magnetism, in particular the establishment of the speed of light based on properties of the "medium" of propagation (permeability and permittivity), led to the development of special relativity by Einstein in 1905. 1820, 1873, 1888, 1896, 1900, 1905, 1907, 1933

Empiricism, view that all knowledge comes from our sense organs, from experience, does not accept any innate a priori knowledge; experiment and observation, One's knowledge cannot go beyond one's experience, John Locke, 450 BC, 387 BC, 1217, 1268, 1600, 1633, 1637, 1661, 1688, 1700, 1739, 1748, 1762, 1781, 1846, 1922

Encyclopedie, Dictionnaire Raisonne des Sciences, des Artes, et de metiers, many volumes, guiding information for the French Enlightenment, founded by Diderot and d'Alembert 1751+

Energy, the capacity of a physical system to do mechanical work. Energy cannot be created or destroyed, only transformed. Work is done by transforming energy from one form to another. When energy is transformed in a closed system the total amount of energy remains constant. Energy is generated in quanta, Planck, 1900. (See mass-energy, Einstein).

Energy & work are measured in the same units, foot-pounds, ergs, joules. 1150, 1687-Newton, 1714, 1751, 1735, 1747, 1800, 1821, 1831, 1824, 1852, 1875, 1877, 1900, 1905, 1913, 1939

Energy, biological/ generated in cells, 1881

Energy, chemical, a special type of potential energy, energy in a substance that is produced by a chemical reaction, like a match burning transforms chemical energy into heat.


Energy, electric, see electricity

Energy, Gravitational, negative energy, 2009, see 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, as moving wind moves boats and produces electricity. KE = .5 x M x velocity squared, 1687-Newton, 1735, 1738

Energy, Light/ photons (composed of hadrons), the visible area of the electromagnetic spectrum, can be converted into heat or electricity, which can
power a motor, 1900, 1924, 1926, 1939, 1964
Energy, nuclear, heat from a nuclear reactor can be converted into electric energy or turn propellers of a ship, 1895-6, 1899, 1926-7, 1936, 1945, 1950, 1953, 1968, 1973
Energy, potential, capacity for a body to do work due to its position or condition, a charge in an electric field, a mass high up has gravitational potential energy, or a tensed spring. 335 BC-Aristotle, 1687-Newton
Energy, pure energy (no mass), photons, sunlight, proportional to temperature, Energy, radiant, the continual emission of energy from the surface of all bodies, in the form of electromagnetic waves. When the waves hit a body not transparent to them, they are transformed into heat.
Energy, radioactive, radiation, 1896, 1900
Energy, Refrigeration, 1852
Energy, thermal, thermodynamics, 1843, 1847 wave theory of energy, 1690, 1736, 1803, 1846, 1900, 1905
Energy-mass equivalence, Einstein, 1905
English constitution, 1748
Enki, Sumer god of creative forces, c5000 BC
Enlightenment, The, Age of Reason, more or less, in Europe characterized by disdain for traditional institutions such as the Church and the monarchy (particularly in France), the adoption of freedom and the appeal to reason in matters of belief and conduct, c1650-c1780. Its 2 main centers were the French Enlightenment, 101, 174, 191 and the Scottish Enlightenment, 95, 173, 181
Enquiry Concerning Human Understanding, David Hume, 1748
Entropy, Lost energy / 2nd law of Thermodynamics, energy lost when one form of energy is transformed into another, the state of disorder in a thermodynamic system, the more energy, the higher the entropy, 1824, 1906-Matter, positive energy, 2009
d’Envieu, Fabre, anti-Darwin, 1859
Epic poems,
Sumerian, Gilgamesh, Epic of Creation, Poem of the Righteous Sufferer, c2000 BC, 1872
Greek, Odyssey, Iliad, Homer, 9th Century BC
Hindu, 400 BC
Mahabharata 600 BC
- Persian / Muslim, Masvani, 1250
English, Beowulf, 1200
France, Chanson de Roland, c1200
Epictetus, Roman, conform nature to reason, “Only the educated are free.” c1300 BC, 120
Epicurean Paradox a/k/a Problem of Evil a/k/a the Argument from Evil, a/k/a The Problem of Unnecessary or Gratuitous Evil and Suffering, Can an entity exist which is omnipotent and loving, but which has not prevented unnecessary or gratuitous evil & suffering? “The premise is that an omnipotent, loving entity (such as the Abrahamic God) would prevent unnecessary or gratuitous evil and suffering of humans and of animals.” So, as such evil and suffering clearly exist, i.e., haven’t been prevented, there cannot be any such entity. In other words, the omnipotence and benevolence attributed to the perfect Abrahamic (Biblical & Muslim) God cannot simultaneously exist if any unnecessary or gratuitous evil or suffering exists. (See God, arguments for and against, this index) c586 BC, 300 BC, 150 BC, 117, 274, 413, 524, 591, 1273, 1536, 1670, 1688, 1710, 1748, 1751, 1788, 1798, 1920, 1925, 1936, 1955, 1974, 1982, 1993, 1990s, Epicurus philosopher/ Epicurean school, Epicureanism, the view that avoidance of pain through an intellectual life is the basis for an ethical life. He stated the Epicurean Paradox (just above), later known as the Problem of Evil, c300 BC
Epistemological Argument for God, see God, arguments for, this Index, and 1993
On the Equilibrium of Heterogeneous Substances (The Principia of thermodynamics), Gibbs, 1875
Equivalence Principle, a space ship’s instruments can’t distinguish between acceleration and gravity, 1907
Erasmus, Desiderus, Brethren of the Common Life, wrote Praise of Folly, 1690, most influential book of 17th century, ridiculed stupid monks & discredited the Christian Church, 1509, 1516-7, 1525, 1545, 1576, 1600, 1605
Eratosthenes, director of Alexandria Library, 240 BC, Erickson, Leif, wintered on Newfoundland c1000
Eschatology: concerning the ultimate destiny of human history
Essais de theodicie: word coined by Leibniz, several arguments to justify evil to refute the Problem of Evil. 1710
Essay Concerning Human Understanding, John Locke, 1690
Essay Concerning Toleration, Locke, 1689
Essay on Miracles, David Hume, 1748
Essays and Reviews, Anglican clerics pointed out scientific errors in the Bible, 1860
Ethical dualism, 620 BC
Ethics, a branch of philosophy, the study of the principles governing right and wrong. Different cultures have different concepts for right behavior. The concept of “social Darwinism,” derived from the biological concept of the “survival of the fittest,” gave rise to much controversy in philosophical ethical circles. Ruth Benedict: Morality is just a term for socially approved customs. 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 consists in accepting the standards of one's age. 430 BC, 425 BC, 335 BC-Aristotle, 44 BC, 1450, 1589, 1670, 1726, 1751, 1789, 1861-2, 1977

Ethology, the study of animal behavior.

Euclid, *Principles of Geometry*, based on self-evident axioms, 300 BC, 524, 711, 1085, 1499, 1687

Newton,1776, 1796, 1915

Eudoxus, Greek astronomer, with Aristotle, taught geocentrism, that the Sun and planets orbit the Earth, 335 BC

Eugenics / artificial selection, branch of natural science concerning making offspring more valuable or societies more capable through selective breeding. Described by Plato. It is the basis of businesses like selling bull semen to produce better cattle. A eugenics movement relating to humans emerged in the early 20th century in the US. It is taught at universities as Animal Husbandry. 1859, 1899

Euler, Leonhard, mathematician, *Nova theoria lucis*. Light is better understood as a wave, 1736


Euthyphro dilemma, What makes an act moral? Socrates asked Euthyphro, 399 BC

Evaporation, the change of a substance from liquid to vapor below its boiling point.


Evolutionary biology, What we are, how we act is the result of evolution. 1975

Existentialism, a body of philosophy that emphasizes the contrast between human existence and the kind of existence possessed by natural objects. Started by Kierkegaard c1846 in reaction against the idealism of Hegel. Sartre, "One is condemned to be free," The plan/essence for a table precedes its existence, but with man, existence precedes essence. Man comes into being; there is no plan / essence for him until he makes one for himself, 1846, 1827, 1943

Experiment: in repeat experiments to test a hypothesis, change just one variable in each successive experiment.

*Extraordinary Popular Delusions and The Madness of Crowds* 1841, Charles McKay, 1212

Faith, belief in a supernatural deity or a pronouncement of a religious authority based solely on the word of a person or writing purportedly inspired by a supernatural entity, like a god. Mencken: an illogical belief in the occurrence of the improbable. James EGunn: Faith can move mountains, or lead a man endlessly down a blind path. Numerous mentions herein. Twain: Faith is believing what you know ain't so.

Fakhr al-Din al-Razi, prominent atheist. The universe has more than a thousand thousand worlds, c1180


Falsifiability, Karl Popper's test of whether a statement is a scientific statement. If it's falsifiable, it's a scientific statement. It is not a test of whether the statement is true but whether it is a scientific statement. 1664, 1687

Faraday, Michael, Brit. concept of fields, magnetic field, electric current can cause motion, 1735, 1800, 1821, 1835, 1838, 1866, 1873

Al-Farghani's *Kitab fi Jawani / A compendium of the science of stars*, 850


Farnese, Pier, son of Pope Paul 3, 1542, 1862

Farrar, F.W. (Re Augustine), 413

Fatima, a daughter of Muhammad, 630

Faulk, Johann von Goethe, 1808

Fear of ideas by clergy, p. 179

Ferdinand, King and Queen Isabella financed Columbus instituted their Spanish Inquisition, 1478, 1492

Ferguson, Adam, Scot, *Essay on the History of Civil Society*, Civil society is synonymous with Modernity, 1768

de Fermat, Pierre, probability, 1645

Fermat's principle of least time, 1020

a Fermat prime (number), 1796

Ferranti, Sebastian, first electric generating plant 1891

Festinger, Leon, introduced and described cognitive dissonance, the extreme tendency of one to hold on to one's beliefs in the face of facts that contradicts such beliefs. 1957

Feudal / feudalism, granting of land and protection by a powerful person to a less powerful person in exchange for money, crops, and/or services, 530 BC, 250 BC, 550, 753, 1000, 1096, 1292, 1453, 1455, 1904

Feuerbach, Ludwig, Divinely inspired morality justifies cruelty. God is a man-made invention 1841


Feynman, Richard, eminent nuclear physicist, with others, combined electromagnetic theory with quantum theory to found quantum electrodynamics 1952. "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.” He also said that “physics is the ultimate intellectual adventure, the quest to understand the deepest mysteries of our universe.” 450 BC, 335 BC Aristotle, 1952

Fibonacci, Leonardo / Leonardo of Pisa, Book of Computations, 1202

Fideist: One who says God might not be able to be proven but has faith there is a God.

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, 1825, 1831, 1860, 1864, 1866, 1873, 1897, 1905, 1907, 1915, 1924, 1933, 1935, 1975, gravitational field, 1905, 1907, 1915, Field Theory, Clerk-Maxwell and Faraday, c1865

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. (Don’t confuse with Fusion, i.e., when nuclei of two atoms combine), 1939, 1953

The Five Pillars of Islam. c640

Five Wounds of the Church, Antonio Rosmini, 1848

Fizeau, Hippolyte-Louis measured the speed of light 1850; analogized the Doppler effect to light waves, 1868

Flaubert, Gustav, Madame Bovary 1847

Flemming, Walther, cells divide into two identical cells, process is called mitosis, 1882

Floating Bodies, Discourse on, Galileo, 1612

Florencce, Italy, c1300, 1310, 1397, 1430-1, c1450, 1453-4, 1516, 1532, 1614, 1624, 1633, 1657

Force, in physics, a vector quantity, with magnitude and direction, a push or a pull, (direct) contact forces or action-at-a-distance forces. Types of forces: centrifugal, centripetal, conservative, electrical, external, friction, impulsive, internal, magnetic, restoring, and nonconservative, (Energy, in contrast, is directionless)

Fideism, 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 be superfluous.

Force, Fraud, Favors, stages of control of people, 1532

Ford, Henry, proved "subistence" wages not practical or necessary, 1817

Foscarini, Pablo, monk, tried to reconcile heliocentrism with the Bible. 1616

Foucault, Leon & Fizeau measured speed of light, 1862

de Foulques, Charles Cardinal / became Pope Clement 4, 1267

Fox, John, 1918

Fox, George (1624-1691) founder of Society of Friends (Quakers) 102, 152-3, 155

Fox, Robert, 1799

France, Anatole, The law in its majestic equality, forbids the rich as well as the poor to sleep under bridges...to steal bread, 1894

Francis of Assisi / Franciscans. 1150, 1200, 1209 (founded), 1217, 1247, 1267-8, 1290, 1331, Francis, Pope, first Jesuit pope, 2013

Franklin, Benjamin, scientist, member of the Royal Society for his work on electricity, statesman, publisher, signed the Declaration of Independence, His Experiments and Observations on Electricity, was widely read in the US and Europe. 1624, 1690, 1715, 1776, 1789, 1911

Franklin, Rosalind, crucial to the discovery of DNA. She suffered significantly professionally due to the shortsighted chauvinism of her colleagues, particularly Watson, 1953

von Fraunhofer, Joseph, in 1814 invented the spectrometer. Discovered that the spectrum of a gaseous body is non-continuous. 1814

Frazer, James’s The Golden Bough revolutionized modern anthropology. 1890

Frederick 1, HR emperor, academic freedom, 1158

Frederick 2, king of Denmark, gave the island of Hven to Tycho Brahe. 1572

Frederick 2 / Frederick the Great, Prussia, patron of intellectuals c1733, 1736, p. 179- the Index

Freedom of thought and speech; The Pew Research Center found that as of 2011, nearly half of the world’s countries had criminal laws against blasphemy, apostasy, or defamation of religion. Similarly, universities in the U.S., once considered homes of academic freedom, have become obsequiously timid about offending anyone and suppress speech, all in the name of “civility,” a totally unrelated concept, what Robert Tannenbaum calls Academic McCarthyism. The “go to” question of every second rate journalist is, “How do you feel about X?” Usual answer, I’m offended.” Numerous thinkers have spoken on freedom of thought and speech, namely:

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.

Euripides: Not to speak one’s thought is slavery.

Robert G Ingersoll: As long as organized and powerful religions pretending to hold the keys to Heaven and Hell, 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.

Pope Pius 9: The insane opinion that liberty of conscience & worship is the right of every man.

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.

George Orwell: If liberty means anything at all, it means the right to tell people what they do not want to hear.

James Madison: There are more instances of abridgement of free speech by gradual encroachments than by violence.

Thomas Jefferson: Reason and free inquiry are the only effectual agents against error.
Benjamin Franklin: Who would overthrow the liberty of a nation must begin by subduing the freedom of speech.

George Washington: If freedom of speech is taken away, then dumb and silent we may be led, like sheep, to the slaughter.

Theodore Roosevelt: To say that there must be no criticism of the president is unpatriotic...servile, morally treasonable.

Oliver Wendell Holmes: The Constitution’s most important principle is freedom of thought for the thought we hate...The best test of truth is the power of a thought to get accepted in the competition of the market.

Louis Brandeis: If there be a time to expose...falsehood ..., the remedy is more speech, not enforced silence.

H L Mencken: I believe in the complete freedom of thought and speech...It is better to know than be ignorant.

Thomas Emerson: Suppression of belief, opinion and expression is an affront to the dignity of Man.

Emma Goldman: The free expression of the hopes and aspirations of a people is the greatest and only safety in a sane society.

William O Douglas: Restriction of free thought and free speech is the most dangerous of all subversions.

Carl Sagan: We must try to free our minds of dogmas and to guarantee the freedom to publish...& to experiment.

Salman Rushdie: The moment you say any idea is sacred, religious or secular, freedom of thought becomes impossible.

UN Declaration of Human Rights: Everyone has the right to freedom of opinion and expression...regardless of frontiers.

Henry Louis Gates Jr.: Censorship is to art as lynching is to justice.

B M Ambedkar: A Hindu must give up his free speech, to act according to the Vedas. He is not supposed to reason.

Pope Gregory 16: “that absurd...raving which...defends liberty of conscience for everyone. From this comes the worst plague of all...unrestrained liberty of opinion and freedom of speech.

Oscar Wilde: I may not agree with you. But I will defend to death your right to make an ass of yourself.

A J Liebling (1904-1963): Freedom of the press is guaranteed only to one who owns one.

Legal Landmarks of free speech:

1735, A jury acquitted Peter Zenger of seditious libel for printing criticisms of the NY colonial governor.

1791 First Amendment: Congress can't pass any law abridging freedom of speech or the press.

1798, Congress's Sedition Act: Can't utter scandalous and malicious writings against the government or Congress, or the president.

1919, Schenk v US: Government can prosecute speech that is a clear and present danger.

1925 Government can prosecute Benjamin for distributing pamphlets urging a socialist state through strikes and other class actions.

1931, Near vs. Minnesota: Government can't censor something before publication.

1940 Smith Act outlawed advocating the desirability of overthrowing the US government.

1940, Cantwell s. Connecticut: State can't prevent an anti-Catholic message notwithstanding a state law intended to protect perceived religious sensitivities.

1941 Supreme Court: [To be restrained], The substantive evil from a speech must be extremely serious.

1942, "Fighting words" are not protected by the First Amendment.

1949 speech is protected unless a clear and present danger of a substantive evil greater than public inconvenience, annoyance, or unrest.

1951 teaching about overthrow is OK, advocating with preparation is not.

1957 Obscenity, Roth v US: Speech utterly without redeeming social importance is not protected.

1964, NY Times vs. Sullivan: The First Amendment was meant to let citizens engage in uninhibited, robust, and wide open speech.

1965 Obscenity, Ginzburg v US: Erotic materials against a background of commercial exploitation of erotica purely for their prurient appeal is not Constitutionally protected speech.

Free Thought, Golden Age of, 1870
Free will, Man can control his actions, 58 BC, 413, 1217, 1525, 1620, 1751, 1819, 1880
(Hume's refutation of, 1751)

Freedom, Academic freedom, 1158

Freedom of thought, conscience, speech, 387 BC, 413, 1200, 1290, 1310, 1339, 1517,1670, 1885, 1670, 1733, 1755, 1789, 1820s, 1835 1864, 1870-1, 1885, 1943,

Freedom from the life cycle of birth. Hindu, 2000 BC


Freedom of the seas, 1625

Freedom, religious, 413, 1200, 1687, 1789, 1815, 1835

Freedom, moral, 340 BC

Freedom to do good, 413

Freedom from desire, Buddhist, 528 BC

Freedom, economic, 1776, 1789

Freedom, sexual, 1787

Freedom from pain, 1863

Freeman, Charles, The Closing of the Western Mind, p. 1, 2003

French Revolution, defining event of Europe, 1789-1796

Freud, Sigmund, atheist, psychoanalysis. Anatomy is destiny, popularized (did not invent) the common concept of the unconscious., “The great unanswered question, What does a woman want?”

c1900+

Friedmann, Alexander, Russian, first to say that the
universe may be expanding 1922,
Frogs, The, 405 BC, Aristophanes, 425 BC
Fukuyama, Francis, historian, c550, c1750
Fuller, Buckminster, genius, used the term dynameix for his concept of the most net performance per gross energy input, thus the geodesic dome (encloses the most space at the lowest cost and uses the least materials). "God, it seems to me, is a verb." 1799
Fulton, Robert, first practical steamboat, 1807
Fundamental particles: Those particles that are not known to be composed of any smaller components such as leptons, quarks & gauge bosons
Fundamentalism, In Christianity, the view that the Bible is literally accurate, generally, strict adherence to the holy scriptures of any sect or religion.
Fusion, when nuclei of two atoms combine and form a different element, 1939

G
Gabriel, archangel, reportedly, Muhammad's connection to Allah, c630
Gaeseric, Vandal, sacked Rome, 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 & black holes held together by gravity. First called nebulae / clouds, as that is what they looked like before telescopes, as opposed to the more distinct stars. Our solar system is in the galaxy Milky Way, Via Lactea. Hubble, who first proved that there were other galaxies apart from the Milky Way, in 1936 classified galaxies by shape, elliptical, spiral, and lenticular, although such categories are rough approximations of the billions of different shapes. Dwarf galaxies can have as few as 10M stars & giant galaxies can have 100 trillion. 964, 1755, 1785, 1886, 1912, 1915, 1917, 1920, 1924, 927, 1929-30, 1933, 1948, 1952, 1961, 1964, 1968, 1970s, 1973, 1992, 2004
Galbraith, John Kenneth, Canadian-American philosopher, "The modern conservative is engaged in one of man's oldest exercises in moral philosophy...the search for a superior moral justification for selfishness."
Galen, Claudius, Greek physician, c160, 1543
Galle, Johann, discovered Neptune in 1846, p. 184
Galton, Francis, founder of eugenics and behavioral genetics, proposed ro produce a race of gifted persons through judicious breeding over several generations, based on Darwinism, 1869
Galvani, Luigi, physicist. 1791
da Gama, Vasco, Portuguese, sailed to India around the Cape of Good Hope in 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, Mahatma, pacifist, invented passive civil disobedience, gained India's independence in 1947
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.
Gasses, laws and properties of, 1624, 1888, 1755, 1775, 1783, 1877, 1802, 1859, 1873, 1877, 1897
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, Gay-Lussac is known for the law of combining volumes, just below, and the law that quantified the temperature factor to James Charles & Guillaume Amontons's temperature addition to Boyle's law of gasses. This has sometimes been referred to as Gay-Lussac's law, but the first known scientist to recognize a relationship between heat and pressure of a gas was Guillaume Amontons c1700, so the law is now more properly known as the Amontons-Gay-Lussac law. 1802
Gay-Lussac law of combining volumes, When ideal gasses combine with one another, they do so in volumes that are in small number ratios. For example, one volume of nitrogen. combines with three volumes of hydrogen to form two volumes of ammonia. 2N + 3H = 2NH3. 1808
Geiger, Abraham, German Reform rabbi, 1820s
Geissler, Johann, neon lights 1860
Gell-Mann, Murray, particle physicist, p. 2015
General Natural History and Theory of the Heavens, Kant, early speculation that there are galaxies other than the Milky Way, 1755
Generation of Vipers, Philip Wylie, 1943,
Genetic mutations: are random, cause new species, de Vries. 1899
Genghis Khan, Mongol conqueror, 1198
Genome, the collective noun for a set of genes, the Human genome has c100,000 genes. 1953
Geocentric theory of the universe / earth-centered, geocentrism / Ptolemaic. Earth is the center and the planets and Sun revolve around the Earth. Advocated by Ptolemy, Aristotle, & the Christian church. It was the prevailing view until the 1600s when Galileo publicized Copernicus's heliocentric Sun-centered system, heliocentrism. 335 BC-
Aristotle, 150-Ptolemy, 1000, 1198, 1464-Epitome, 1536, 1543, 1632, 1962

Geographia, 2nd century Ptolemy map brought to Florence, 1400

Geography, 900 BC, 150 BC, 910, 1000, 1519, 1545-6, 1748, 1887

Geological Evidences of the Antiquity of Man, Lyell, when Lyell embraced Darwinism, 1863

Geology, the science of the physical structure and composition of the Earth, p.2, c1000, 1060, 1486, 1671, 1749, 1795, 1815, 1830-2, 1838, 1859, 1911

Geometry, 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, c825, c850, 1085, 1202, c1225, 1430, 1499, 1614, 1633, 1637, 1796, 1826, 1905, 1915

Geometry, Elements of Euclid c300 BC

George 3, Obtuse English king during American Revolution, deposed as insane in 1811. 1765, 1775

George, Henry, land reform, Progress and Poverty. 1879

Germ theory of disease, Louis Pasteur. 1862

von Gesner, Konrad, Biblioteca Universalis, Historia Animalium, paleontologist, bibliographer, 1545

Gettysburg Address, Abraham Lincoln. 1863

Gezari, Suvi, published a photo of a black hole engulfing a red giant star, 2012

al Ghazali, conservative Muslim cleric, discouraged 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

Gibbs, J. Willard, thermodynamics, 1875, On the Equilibrium of Heterogenic Substances, 1875, 1877

Gide, Andre, French writer, p. 179 The Index

Gifford, Henry, made a balloon powered by a steam engine, 1852

Gilbert, William, physician to the queen., said Earth is a magnet, De Magnete, 1600

Gilgamesh, Sumer King, first known epic, part of a trio of Sumerian epics, with The Epic of Creation & the Poem of the Righteous Sufferer. c2000 BC, 1872

Gladstone, William, English PM, friend of Acton, 1862

Glasgow University, with Edinburgh University, around 1700 liberalized and softened the harsh tenor of Scottish Presbyterianism and educated many of the leaders of the Scottish Enlightenment. John Simson, professor of Sacred Theology at Glasgow directly challenged the harassment of old Calvinist dogmas and taught a kinder and gentler God. Home to William Thomson. 1408, 1846

Glashow, Sheldon, physicist, with others, showed that the 4 fundamental forces were actually 3. Nobel Prize, 1968

Gleiser, Marcelo, astrophysicist, A Tear at the Edge of Creation 2010,"There is no final "right" to be arrived at, only a sequence of improved descriptions of the cosmos. Each era, each generation even, will describe the universe in different ways that may be radically different from the preceding one.” 2010

Gnostics / Gnosticism, early Christian sect, dualists, they 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 Turkey, first known man-made structures, presumed a religious site, c9000 BC

God: There are numerous concepts of gods, from a monotheistic God to thousands of minor gods. In some Eastern religions, God is simply a force in all imaginable phenomena. God, in most modern Western societies, is monotheistic: (In this history, the concepts of monotheistic Gods are capitalized, lesser gods are not). Monotheistic religions, of which there are many, all believe in one supreme all-powerful all-knowing God. The Christian, Jewish, and Muslim Gods are called an Abrahamic God as all trace to Abraham. Each religion has its particular set of beliefs as to the nature of its God. The National Catholic Almanac (1968) says its 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 (inexplicably), incomprehensible.” (Most of these attributes are attributes of personality rather than of essence.) Protestantism: Martin Luther (1517) agreed that God was incomprehensible. Most monotheistic religions have definitions of their God which are quite similar to the Catholic one, but some also have different and sometimes contradictory beliefs which define their religion. These differences have historically been the cause (or at least the excuse) for horrendous wars and suffering. Catholic versus Protestant wars wrecked and wrecked Europe for generations. The Christian Crusades caused untold deaths and suffering. See Evil in the Name of God, p.187. Pantheists see god as a force in everything in nature. The Muslim Koran has 99 words for its Allah, such as “most magnificent, most holy, most loving, all-knowing, most powerful, compassionate, gracious, etc.”

God(s): There are numerous different lesser gods in most religions and cultures, historically and currently worshiped. They normally are thought to have limited supernatural power of some sort, like a god or goddess of the hunt, or the sea, but not supreme supernatural power,

God, arguments for: Carneades 150 BC: "The existence of God is not self-evident and therefore needs proof. Any argument that assumes a God exists does not prove a God exists.

Arguments for a God can be characterized as metaphysical, logical, empirical, and subjective.
Those whose livelihood depends on people believing in God, mostly clergy, have throughout history devised arguments meant to convince people that such clergy’s God exists who commands worship and obedience, presumably as the clergy instructs. Historically, the clergy have been among the ruling class and religions’ dogmas (but not Jesus’ teachings) have favored the ruling class. The religious community in the US includes around 685,000 clergy and seminarians, plus persons connected with non-denominational churches, lay persons employed in religious organizations and industries which service the religious community.

Russell said that all arguments designed to reach a conclusion one wants to reach is not philosophy but special pleading. Pope John Paul 2 abandoned science, i.e., rational arguments for God in 1988.

There are dozens of arguments of several types for the existence of the Christian / Jewish / Muslim / Bah’ai / Mormon God. This history mentions only a few.

All purportedly rational arguments for God are inductive, God by inference and God by Default arguments where the conclusion is not certain but is dependent on the strengths of its premises. Inductive arguments for God are part of natural theology, i.e., there are circumstances in the natural world that infer that a God currently or once must have existed, Natural theology arguments do not erase the logical contradiction inherent in the Abrahamic God pointed out by the Problem of Evil. A God could of course make all arguments for his existence moot simply by showing up. Short and incomplete descriptions of some arguments for God (some contrary arguments) are as follows:

**Aesthetic / Argument from Beauty**, Beauty exists, only God could create such beauty, So God exists. [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 a different beauty.] 425 BC, 1273

**Anthropic Principle / Argument from fine tuning**, a modern deist adaption of the Design Argument. God is inferred because of the improbability of life due to the precise physical constants and coincidences that must exist on a planetary and molecular basis, which only a God could cause. 1973. Contra: several arguments. See at 1973

**The Argument from Reason**: C S Lewis argued that naturalism “impugs the validity of reason and rational inference,” and as such, naturalists contradict themselves if they use reason to defend their beliefs. Conclusion: On the most basic level, naturalism as a process of drawing logical inferences is that of physics without reference to purpose or logic.

**Argument from Authority**, “How do I know? The Bible tells me so,” AD 200 This is a circular argument.

**Argument from Consciousness**, 2000, Materialism can't explain how evolution changed the water of biological tissue into the wine of human consciousness. Only theism can. Thus, we infer a God must exist and have done it, J P Moreland. 

**Argument from Eternal Truths**, certain statements are always true, eternal, and can only exist in the mind of God, so God exists, Leibniz, 1710

**Argument from Miracles**, X preformed a miracle so X is a god (St. Paul's argument: Jesus arose from being dead, a miracle, therefore he is God), 45, 1748. Contra: Hume on Miracles. 1748

**Argument from Morality**, C S Lewis, All people have a notion of right and wrong and the only reasonable explanation for this is that God implanted such notions in people. There are two basic contrary arguments. 1. There's no evidence that all people have a notion of right and wrong. Many moral norms differ greatly from culture to culture. They are, if anything, taught. 2. If there is some supernatural power imparting morality notions, this is the fallacy of affirming the consequent, a circular argument, 1788, 1947

**Argument from Desire**, also C S Lewis, humans have an innate desire for joy beyond the natural world, thus must be an object to satisfy that desire, therefore God. Beversluis disputes the universality of a joy for life beyond the natural world; says lots of people are satisfied with their lot, with their careers, their family, some ideology. 1947

**Argument from Pre-established Harmony**, There is no causation in the world but that each event arises when it does because it was pre-programmed to do so by God when the universe began. Also the perfect functioning of mind and body, as ordained by God, Leibniz, 1710

**Argument from Religious Experience**, I saw/ felt and/or spoke to God, so He exists. This argument depends entirely on the likelihood of its accuracy given all the circumstances. If there is one God, all reports of contact with him / her / it would be the same. They aren't. As Hume would say of other miracles, What is more likely, that one did speak to God or that somehow one was mistaken? 1300 BC, 1637, 1748

**Christological Arguments for God**, have three forms,

1. Argument from the wisdom of Jesus.
2. Argument from Jesus’ claims to be God.
3. Argument from the resurrection, a miracle.

Specifically, 1. Jesus’ wisdom is clear. One of his views is that God exists. Therefore God’s existence is likely. Contra: As a miracle presupposes the existence of a god, it cannot be used to prove one. Bertrand Russell criticized many of Jesus’ views as not what would reasonably be considered God-like.

2. He says he’s God. He wouldn’t lie, This is similar to C S Lewis’s “Liar, Lunatic, Lord Trilemma.” Namely, Jesus claimed to be God and the only two alternatives are liar and lunatic, both of which are
refuted by his moral teachings. Thus He is God. Contra: John Beversluis disputed the premise that there are only three alternatives, the most likely non mentioned alternative being that Jesus was simply mistaken. AD 45, 1947

**Cosmological Arguments**, a family of arguments, including the *Kalam Argument*, the *First-cause Argument*, and the *Contingency Argument*, all premised that the universe must have been "caused" and as we can not think of any natural cause, the only possible original cause is a supernatural causer, i.e., God. Averroes posited a cosmological argument. Aquinas posited 4 cosmological arguments, 1273. Specifically, our everyday experience tells us that everything has a cause, so there must be an ultimate first cause, that's got to be a God. The theist here denies man the possibility of understanding nature. The theist declares the universe unintelligible. An explanation builds a conceptual bridge from the known to the unknown, linking the unexplained to the context of one's knowledge. The theist is explaining the unknown with an unknowable. The theist asks for an explanation and declares that there is no explanation. Contra: Saying the First Cause doesn't need a cause takes one out of the realm of rational argument and simply assumes that there is a God beyond time and space and matter. Hume: The premise of causality is based on a *posteriori* reasoning, which is dependent on experience. He argued that causal relations are not true a *priori*. Also, it is unwise to draw conclusions from an extrapolation of causality beyond experience. Furthermore, cosmological arguments don't get one very far. They don't get one to any concept or belief beyond a creator, who/which could have been evil, incompetent, long since no longer existing, or multiple entities. A cause of the universe is itself seriously questioned by eminent cosmologists, like Hawkins, Krauss, & Wilzek. 335 BC-Aristotle, 230, 862, 1085, 1150, 1273-Aquinas, 1687-Newton, 1710, 1714, 1739, 1779, 1781, 1928-9.

**Epistemological Argument**: The existence of knowledge infers a God, 1993

**God of the Gaps Argument**: There are gaps in the fossil record, thus evolution is false, and there are still unknowns in science, thus there must be a God who would explain such gaps. Contra: Gaps don't necessarily imply or infer a god. They as readily infer as yet unsolved issues. Science is in any case closing the gaps. With the advance of scientific knowledge, theists have effectively been reduced to just the origin of the universe & the origin of life, certainly crucial issues. The *God of the Gaps Argument* doesn't get one very far. It simply asserts that at some time in the past a supernatural entity created the universe. It does not infer any particular god or God or any particular religion or belief system. 1950

**Intelligent Design**, a recent re-writing of the *Design/Teleological Argument*, developed by substituting the phrase *Intelligent Design* for the word God or Creator (sometimes simply with a word processor) in texts positing the *Design Argument* and meant to circumvent the US Constitutional prohibition of agencies of the state such as public schools, from promoting religion. The "designer" implicitly but not explicitly is God. Federal judge John Jones described *Intelligent Design* in 2005 as "breathtaking insanity." 1987, 2005

**Ontological Argument**, Anselm posited that the idea of a perfect God proves his existence. Anselm emphasized perfection. Guanillo refuted it immediately. 1076, Aquinas rejected it. 1273. Descartes's *Ontological Argument*: God's existence is inferred from the fact that necessary existence is 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. 1637, 1644

Spinoza devised an *Ontological Argument*, 1670

Kant destroyed Anselm's argument; said it used two distinct modes of thought and just assumed a God, not proved a God. 1781.

**Presuppositional Argument**: Cornelius Van Til. The existence of God can not be proven by appeal to raw facts, but God’s existence can be proven by the very same belief and is the necessary condition to the intelligibility of all other human experience and action. The argument is that all human experience and action (even the condition of unbelief) is proof for God’s existence, as God’s existence is the necessary condition of their intelligibility. This is akin to the *Ontological Argument*. 1928

**Deism / deist**, 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 left it alone to evolve by laws of nature that He established. 1624. Most of the arguments against the *Anthropic Argument* apply to deism. 335 BC-Aristotle, 1273, 1624, 1686, 1730, 1733, 1739, 1751, 1758-9, 1776, 1783, 1789, 1799, 1973, 2000


The *Underachiever Problem of the Design Argument*: The world is so full of cruelty, evil, and suffering that it could not have been created by a loving, omniscient supernatural entity

Muslims believe that the revelation of its Koran vindicates its divine authorship, and thus the existence of their God / Allah.
Mormons say that the miraculous appearance of God, Jesus Christ, and angels to Joseph Smith and others and the finding and translation of the Book of Mormon establishes the existence of God.

The Stranglent sect of Mormonism says that the finding and translation of the plates of Laban into the Book of the law of the Lord and Voree plates by James Strang established the existence of God.

God, Arguments against the existence of the monotheistic Abrahamic God and proposed answers to such arguments. John Stuart Mill: “The tendency has always been strong to believe that whatever received a name must exist as an entity or being, having an independent existence of its own. And if no real entity could be found, men.... imagined that it was something particularly abstruse and mysterious

Problem of Evil aka The Epicurean Paradox, fully expressed as The Problem of Unnecessary or Gratuitous Evil or Suffering. This problem is the definitive logical refutation of the proposed Western Abrahamic (Biblical and Muslim) God. An articulation of the problem that does not assume that a god exists states the problem as, “Can a omnipotent, omniscient, benevolent and loving entity exist which does not prevent evil and suffering? Logically, No, as an omniscient, omnipotent, loving, merciful, benevolent entity would prevent gratuitous or unnecessary evils & sufferings. This is true even if there were only one example of gratuitous or unnecessary evil or suffering. The problem does not logically refute every concept of a god, only those whose claimed characteristics make their existence logically impossible. A J Ayer 1936: The Problem of Evil falsifies the Christian God, similarly, Mencken 1930s. Bart Ehrman: God’s Problem, How the Bible Fails to answer Our most Important Question-Why We Suffer 2008- says that The Bible gives unpersuasive and contradictory answers. 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 evil]” As the Problem of Evil refutes the Abrahamic God, Christian & Muslim theologians throughout history have devised arguments, mostly attacking the premise, to get around it.

One way to get around the problem is to accept the obvious existence of evil and suffering but to attack the premise & say that God has some morally sufficient justification to permit evil and suffering. Leibniz (1710) proposed several justifications for evil & suffering. He called them theodicies. For any theodicy / justification to be adequate, it must justify all unnecessary or gratuitous evil and suffering, not just some. Any justification for evil & suffering / theodicy must accept that God has OK’d every instance of unnecessary & gratuitous evil & suffering that has ever happened in the world, no matter how horrible.

The Hebrew Bible: (586 BC) Evil is justified as it's retribution for Man's sins, or a test of faith, Job. Irenaeus (AD 177) and John Hick (1963) contend that evil and suffering are necessary for man’s spiritual growth. [Inter alia, Theodicies do not justify animal suffering]; Malthus (1798) said that evil exists to spur human creativity. Malebranche (1688) argued that God permits evil to get the best balance in the world.

The basic flaw with theodicies is that if the evils and suffering in the world could be justified by God for some reason, as theodicies contend, then God has justified all the gratuitous & unnecessary evils and sufferings that have plagued Mankind. If God can OK the Black Death, tsunamis, 9/11, all disease, all torture, all cruelty, and the Holocaust, what won’t He OK? Hume: How can the most pious man know what is OK with God?

Another way to get around the problem is to redefine evil. Augustine (413) and Aquinas (1273) Evil is just the absence of good, thus not a thing [disease is just the absence of health]; Similarly Spinoza (1670) said that Evil doesn’t exist as its all part of one great reality.

Others have argued the “free will defense.” Francisco de Vitoria (1536) justified evil by saying that God gave Man free will, which necessarily means man was free to do evil, Plantinga, for example (1974, 1993) says absolute / libertarian free will is so important in God’s plan, it justifies any evil caused by man’s free will. Mackie in 1955 had answered this. God could have made man so good he would not free willingly choose to do evil. Hume argued the free will defense was limited to moral evils, that the free will defense meant that God chose the free will of the evil doer over that of the victim, and mis-stated history. (See Hume at 1751)

There are other approaches. Mani (AD 274). There’s a good god and an evil god, i.e., not monothestic. One current theological answer is simply to call it a mystery, i.e., the mystery of evil. This is simply saying man is too dumb to understand.

Boethius (524) and Gregory the Great (591). John Stuart Mill (1843). God isn't omnipotent.

Muslim responses to the Problem of Evil are similar to Christian responses. Namely, evil is a test of the victim, sometimes it's a test of persons who see someone suffering, sometimes suffering is the result of sin, and sometimes Man is not

Problem of Contradiction a/k/a Problem of Contrariety, Hume, expressed also by Julian, 4th century AD, is based on the second basic law of thought, that is, two contradictory statements (like dogmas of different religions) can't both be true. Both in fact may be false. The many different & contradictory beliefs of religions thus at the very least, invalidates all religions but one. The practical consequence of different dogmas is that dogmas of some religions demand killing people, 65 BC, 363, 910, 1748-Hume, p. 178

Problem of an Unknown Cause. The Cosmological Arguments (above, God, Arguments For) rest on the proposition that there must be an ultimate first cause for the existence of the universe (which is at present unknown) and, as we can at present think of no natural first cause, the ultimate first cause must be supernatural, i.e., God, who is uncaused. This an argument from ignorance, namely Man's current ignorance of a first cause and then inferring another mystery, God, to solve the first mystery. As Lagrange said of the God hypothesis 1799, "It explains many things."

Cosmologists and astrophysicists have at least two responses to the first cause argument, 1. Some cosmologists say the universe was uncaused. and, 2. Some accept that there could be a first cause but that cause has simply not been discovered yet. Cosmological arguments do not get one very far. They only argue that some supernatural entity at some time caused the universe to exist. There is no logical connection between a first cause and any particular god (Catholic, Baptist, Muslim, etc.) Russell said that if God can be uncaused, why not the world? 1912

God Paradoxes, a/k/a God versus world paradoxes.

Omnipotence Paradoxes, logical contradictions based on characteristics attributed to a supernatural god in light of the reality of the natural world. These arguments are structurally akin to the Problem of Evil. They contrast the purported attributes of the Abrahamic God with the realities / sufferings in the world, i.e., See 414-Augustine for more.

The Problem of Scriptural Errors. Nonsensical and factual errors in the Bible discredit its reliability. The Oxford Declaration, "If any part of the Bible was seen to be in error then the whole of it could be called into doubt." 414-Aristotle, 870-ibn al Rawandi, 1122, 1633-Galileo, 1687-Newton, 1864, 1893, p. 178

Problem of Divine Hiddenness, akin to the Problem of Evil, If the proposed Abrahamic God exists, Why doesn't He do something Man can see, maybe even something worthy of worship? P. 178

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 kinds of animals and all the different planets, 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 and evil - which is all religion has. The stage is too big for the drama." 363-Julian, 1795-Paine

Problem of the Unknowable God: If a proposed God unknowable, it defeats various sects' claims that God has certain characteristics that support that sect's beliefs. This argument is inconsistent with all the statements about God and statements by God in the Bible. Plus, if God is unknowable and incomprehensible, one cannot make any authoritative statement about God, good or bad, or about his character. Nicholas of Kues / Cusa, 385, 413, 862, 1190, 1841, 1869,pp. 178-9

Problem of the Unfulfilled Promise to return to Earth before the death of some who were hearing his promise. Matt. 10:33, 16:28. 24:33, 2 Thess.2:1-2. The Second Coming is mentioned hundreds of times in the New Testament. As Jesus has not lived up to his word to return, he could not be God.

Problem of the Broken Promise to answer prayers: Jesus promised believers to give them what they ask for. Assuming people have asked for relief from suffering, the widespread misery among Christians infers that Jesus' promise was false, thus Jesus is not God. The largest objective documented test of Jesus' promise is the record of the healing shrine at Lourdes which has had over 200 million visitors in 157 years, presumably asking for Jesus to cure some ailment. Currently 6 million visit every year. Various bishops have "validated" 69 miraculous cures at Lourdes (Seven the first year, three in the last 50 years). Skeptic Joe Nickell has said that virtually all such "miracle cures" were of medical conditions susceptible to psychosomatic influence or known to show spontaneous remissions. Did only 69 visitors pray for a cure in 157 years? Why not 200 million miracle cures?

The God hypothesis (hypothesis that a God exists), term referred to by Laplace, 1799, 1973.

Godel, Kurt, incompleteness theorems, 1931

Godfrey, Thomas, developed the octant, 1150

Godwin, William, political theorist, 1793

von Goethe, Johann, most prominent and influential German in his lifetime. Faust (deal with the devil) 1801+, 1633, 1762, 1772, 1808, 1832

Gold, Thomas, Herman Bondi, and Fred Hoyle posited a steady state model of the universe 1948

Golden Age of Freethought, in the US. c1870s

Golden Rules, several examples from different cultures, 1300 BC, 530 BC, 1788, 1916

Gondwanda hypothesis, that S. America, Africa, Arabia, Malagasy, India, Australia, New Zealand, and
Gregory I, the Great, increased the bishop of Rome's power vis-a-vis the emperor and other bishops by acting like a preeminent bishop. He is also considered a pope. Said, "Faith has no merit where human reason supplies proof." p. 1, 335 BC, 300 BC, 591, 1670, 2013

Gregory 7, Pope, Didactus, Church never errs, 1073
Gregory 9, Pope, said slavery is OK, 1215, 1233
Gregory 10, sent priests to China with the Polos, they turned back before they had gone far, 1271
Gregory 12, pope, moved back to Rome from Avignon, so ended the Schism, 1417
Gregory 13, praised killing 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, invented but did not build the reflecting telescope. A six inch reflecting telescope had the same effectiveness as a six foot refracting telescope as it eliminates the distortions caused by lenses. 1663

Grew, Nehemiah (1641-1712) Brit. His Anatomy of Plants posited that plants reproduced sexually, that individual grains of pollen were the equivalent of sperm cells of animals. 1682
de Groote, Geert, holy lay man, founded the Brethren of the Common Life. 1380

Grosseteste, Robert, bishop of Lincoln, 1200, 1225, 1269, 1687

Grotius, Hugo, international law, Concerning the Law of War and Peace: He introduced the concept of natural rights of individuals, 1536, 1600, 1625

Group theory: In politics, 20th century theory that the actions of groups acting in their interests are the most significant sources of policy and the substance of politics, not individuals nor whole societies. Organizations representing groups' influence comes from the perception that they speak for all members of their constituencies. The hierarchy of groups tend to evolve to act to perpetuate their own organization as much as to protect and promote their constituencies. Like individuals, the wealthier groups have power disproportionate to their number.

Grünaub, Adolph, eminent philosopher, p.177

Guanilo, monk, ridiculed Anselm's Ontological Argument. 1076

von Guericke, Otto, electric generator, 1663

Guide for the Perplexed, Maimonides, 1190

Guild socialism, workers should control their own crafts, and be responsible to the interests of society.

Gulliver's Travels, satire, Jonathan Swift, 1726

Gutenberg, Gustavus Adolphus, invented the printing press system, with movable type, a new press, a new ink. He printed 300 copies of the Gutenberg Bible, first book printed in the West with movable type, c1454

H

Habitas, Frederick 1, origin of academic freedom,1158

Hadith, sayings of Muhammad, 846, 1085

Hadley, George, movement of water in Hadley Cell, climatologist, 1735

Hadley, John, developed an octant to determine
Hegel, George Wilhelm, philosopher, concept of absolute spirit, the world of ideas progresses by "thesis, antithesis, synthesis," repeat, 1768, 1820, 1841, 1845, 1848, 1859, 1881

Heidegger, Martin, *Being and Time*, 1927

Heine, Heinrich, German poet, p.177, *The Index

Heisenberg, Werner, uncertainty principle. 1927

Heliocentrism, Sun centered planetary system, 2700 BC, 700 BC, 1032, 1514, 1536, 1547, 1568, 1600, 1610-Kepler, 1616-3, 1624, 1632-3, 1644, 1664, 1687-Newton, 1766-7, 1702, 1800, 1860

Helium, two protons, p.2, 1860, 1939, 1948, 1953

Hell, in most religions, an afterlife of eternal pain. For Dante, a place with interesting people, 586 BC 45, 70, 413, 610, 644, 1150, 1306, 1310, 1516, 1651, 1787, 1864

Heller, Alex, *Astronomy Timeline*, p.182+

von Helmholtz, Hermann, discovered first law of thermodynamics, 1847

Heloise, student of, wife of, Abelard, mother of Astrolabe, later a nun, c1122

Helvetius, Claude, Adrien 1758+, deist, *De l’Esprit*, individual differences are due solely to education, i.e., nurture, in the nature vs. nurture debate, 1758

Hemingway, Ernest, *Farewell to Arms*, Old men do not grow wise. They grow careful. 1929

Henry 3, HRE, French, deposed two popes and put in Clement 2 who crowned him HR Emperor, 1058

Henry 4, French king, *Edict of Nantes*. 1589

Henry 7, English king, sponsored the Cabotos’ explorations of North America, c1500

Henry 8, English king, declared himself head of the Christian Church in England in 1533. It later evolved into the Anglican / Episcopal Church.

As head of the Christian Church in England, he murdered thousands, including two of 6 wives. 1500, 1525, 1533

Henry, Prince, the Navigator, Portugal. 1419, 1450, 1497

Hera, Greek goddess of women, 750 BC

Heraclides, posited that the Earth revolves, & that Venus and Mercury orbit the Sun c350 BC

Heraclitus, Greek, All is in a state of flux c500 BC

Herbert, Edward, founded deism. c1624

von Herder, Johann Gottfried, father of modern nationalism, humanist, 1772

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." Thus a threat to the power and authority of the clergy, the worst sin. Generically, one who does not believe the speaker’s religion. One religion’s heretic can be another religion’s saint. Heresy is viciously persecuted. 586 BC, 200, 325, 392, 413, 750, 1121, 1147, 1184, 1208, 1250, 1273, 1376, 1414, 1440, 1516-7, 1525, 1536, 1545, 1614, 1650, 1689, 1820, 1907, 1978

Hermeticism, 15th century religious movement. c1450

Hero, Greek, taught mathematics at Alexandria, developed a simple steam engine, 50

Herodotus, Greek, historian, 490 BC, 1514

Herophilus, c100 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, p. 182+ Astronomy Timeline,
Hertz, Gustav, physicist, electrons, 1912
Hertz, Heinrich, electricity, 1887, Timeline, p. 136
Hertzsprung, Enjar, discovered correlation between
brightness and size of stars. 1908
Hess, Henri, thermochromy 1840
Hick, John, (1922-2012) Eminent Christian theologian,
advocate for religious pluralism. Re the Free Will
defense, echoing Irenaeus AD 177, argued that
God created the world for "soul-making," for Man
to cope with the difficulties (and evil and
suffering) in the world to become "children of
God." God did not intend for the world to be a
"permanently hedonistic paradise." [A false
dilemma, A straw argument]. After his
Episcopalian Church twice accused him of heresy
for arguing the toleration of other religions, he
became a Quaker. 1963. 1993
Hilary, bishop of Poitiers, 355
Hindu / Hinduism, 18th century name given by
Westerners to the collective and widely varied
religious beliefs of India whose common basic
belief was the caste system, 2000 BC, 1300 BC,
620 BC, 528 BC, 510 BC, $00 BC, 325 BC, 45, 50,
499, 879, 1500, 1560, 1663, 1750, 1875, 1927, 1947
History: and fields like it are too easily manipulated
and colored by biased human hands gripping their
own agenda, David Baldacci
Hipparchus, astronomer, charted 850+ stars, c146 BC,
Historia Animalium 1551, Konrad von Gesner, 1545
Historia Plantarum, Theodore of Gaza, 1483
Historical and Critical Dictionary, "to destroy the vices
of religion," Pierre Bayle, 1696
Historie Universelle, Voltaire, 1753
History of Florence 1525, Niccolo Machiavelli, 1532
History of the Conflict Between Religion and Science,
John Draper, 1886
Hitchens, Christopher, Brit, writer, philosopher,
atheist, God is not Great, 1925, pp. 188 & 212
Hitler, Adolph, universal symbol of evil, Mein Kampf /
My Struggle, The great masses of people ...will
more easily fall victims to a great lie than a small
one, 1543, 1751, 1933, 1939, 1966
Ho Chi Minh, liberator of Vietnam, 1945
Hobbes, Thomas, Leviathan 1651, materialist, "Life in
nature is "solitary, nasty, poor, brutish, and
short," "Science is the knowledge of
consequences and the dependence of one fact
upon another... I help a beggar to end my
discomfort at seeing his discomfort." Men are
naturally selfish, men need a strong ruler to keep
them in check....Morality is a man-made concept,
not divinely inspired." c8000 BC, 1532, 1586,
1600, 1609, 1624, 1633, 1637-8, 1651, 1670, 1689,
1719, 1725, 1762, 1800, 1859, 1865, 1973, p. 179-80
Hoffer, Eric, The Ordeal of Courage 1963, Power
corrupts the few [only a few have power], while
weakness corrupts the many. Hatred, malice,
rudeness, intolerance and suspicion...are the
fruits of weakness.
d'Holbach, Baron, Paul Henri Thiry, philosophe, atheist,
who wrote for the Encyclopaedia, All religions are ancient
monument to ignorance, superstition, ferocity; and
modern religions are only ancient follies
rejuvenated. 8000 BC, 1700, 1751, 1761
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, jurist, The life of the law
has not been logic. It has been experience.,
Holy Roman Empire ("HRE"): 726, 789, 799, 1046,
1073, 1085, 1198, 1305, 1324, 1414, 1431, 1453,
1517, 1545
Holyoke, G J, English social reformer, doubted God. So
he was jailed. 1842
Home, Henry/ Lord Kames, Edinburgh, mentor of David
Hume, influential jurist of the Scottish
Enlightenment, 1725, 1734, 1777
Homer, non-literate Greek poet, reputed author of The
Iliad & The Odyssey, 900 BC, 387 BC,
335 BC-Aristotle, 25 BC
Hominids, primates that are more closely related to
Homo sapiens than to chimpanzees, a number of
paleontologists now use the word hominin. 7M BC,
1.9M BC, 700K BC, 500 BC, 1973
Homo erectus, early and extinct Homo species,
1.9M BC, 700K BC, 1892
Homo ergaster, 1.6M BC, first long legged hominids
Homo habilis, early Homo species
Homo heidelbergensis, probable ancestor of Homo
sapiens & Homo neanderthalensis
Homo naledi, found in 2013 in S Africa, 1.8M BC. 2013
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, physicist, Micrographia 1665, curator of
experiments for the Royal Society, rival of Newton,
1250, 1600, 1656, 1665-6, 1670, 1675, 1684, 1687-
Newton, 1704,
Hooker, Joseph, urged Darwin to publish Origin of
Species, later president of Royal Society, 1860
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, 1964
Hubble Constant, the rate the universe is expanding.
Hubble Sequence, system of classifying galaxies
according to their shape devised by Hubble. 1929
Hubble Space Telescope, launched in low earth orbit
in 1990, Astronomy Timeline, p. 182+
Huggins, William and Margaret, discovered the Doppler
shift of Sirius, as predicted by Doppler, 1868
Hugh of St Victor Abbey, Study everything, 1130
Hugo, Victor, Les Miserables 1862, Nothing else in
the world...not all the armies...is so powerful
as an idea whose time has come., 1624, 1847
Huguenots, French Protestants, 1572
Hutton, James, geologist, 1258

Hulagü Khan, grandson of Genghis, burned Bagdad, 1258

Human capital theory, expenditures on training and education should be considered an investment, not an expense, as they are made to increase productivity and income.

Human sacrifice, 2000 BC, 586 BC, 1519

Humanism: ethical system based on Man, not on a belief in supernatural being(s), 2000 BC, 1217, 1300, 1339, 1352, 1397, 1473, 1486, 1512, 1517, 1525, 1580, 166=33, 1772, 1863

Humason, Milton, with Hubble, formulated Hubble's Law, 1924, 1929-30

von Humboldt, Alexander, eminent naturalist, Geographer, in his time, second most famous man in Europe to Napoleon, posited that the tree line will occur at lower and lower altitudes as one moves further from the equator and reaches sea level above the Arctic Circle. 1799

von Humboldt, Wilhelm, Prussian, linguist, education reformer, 1810

Hume, David, Edinburgh, a prominent leader of the Scottish Enlightenment; Treatise of Human Nature. On Civil Liberty, Essay on Miracles, Concerning Human Understanding, Dialogues Concerning Natural Religion. It is not certain that an opinion is false because of its dangerous consequences.... Where men are the most sure and arrogant, they are commonly the most mistaken. 1858.

Hume's law, informal name for a distinction between statements of fact and utterances that have an "ought" in them. Hume's Treatise of Human Nature said utterances with "ought" in them could never be logically derived from statements of fact. 1739

Huns/Hsuing-nu nomads, Mongolian, 150 BC, 100, 410, 475

Hunter, John, Scot, turned surgery from a barber's part-time job into a scientific discipline of anatomy and biology. He taught surgery to Edward Jenner, who developed a smallpox vaccine. 1770s

Hus, Jan, Rector of Karlova U., preached against the corruption among the clergy, so the pope killed him, 1378, 1398, 1409, 1414, 1517,

Hutcheson, Francis, an Ulster Scot, philosopher, political theorist, a leader of the Scottish Enlightenment. 1725, 1768, 1776, 1789

Hutton, James, geologist, A Theory of the Earth, with Proofs and Illustrations. 1795

Huxley, Aldous, Brave New World 1932 (title from Shakespeare), 387 BC, 1532, 1779, 1932, 1944

Huxley, Thomas, 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, 1847, 1859-60, 1880, 1893

Huygens, Christiaan, formulated the wave theory of Light in 1678, but only published in 1690. Each point of light at the front of a wave may be regarded as a small source of wave motion. The waves produced by these small sources are called secondary waves. 1600, 1656, 1670, 1687-Newton, 1690, 1803, 1866, 1900,

Hydrodynamica, Daniel Bernoulli, laid the basis for the kinetic theory of gasses. Gasses are innumerable particles bouncing against one another, the hotter, the more bounce / pressure, 1738

The Hydrostatic paradox, more accurately named the hydrostatic principle: the pressure of liquid at the bottom of an open vessel depends solely on the height of the liquid, not the shape of the vessel. This is not a real paradox for those familiar with physics. Stevin, 1585

Hypatia, famous teacher in Alexandria, tortured to death by Christian monks for being a pagan, 415

Ibsen, Henrik, The Wild Duck 1884, Rob the average Man of his life-illusion and you rob him of his happiness. (A saving lie is a lie one tells oneself to raise one's self-esteem). The majority has the might - more's the pity - but it hasn't the right..The minority is always right. " An Enemy of the People, 1847, 1881

Ideas: Keynes, Ideas shape the course of history. 1936

S.T. Coleridge, "The wise only possess ideas; the greater part of mankind are possessed by them."

Fyodor Dostoyevsky. 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.

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. No army can withstand the strength of an idea whose time has come.

Sir Frederick Banting. No one has ever had an idea in a dress suit.

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

Oliver Wendell Holmes, Jr., The ultimate good is better reached by free trade in ideas. The best test of truth is the power of the thought to get itself accepted in the competition of the market.

Thomas Mann, It is impossible for ideas to compete in the marketplace if no forum for their
presentation is provided or available.

An idea that is not dangerous is unworthy of being called an idea at all.

Idealism, 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, 1841, 1846-8

Ideology, a set of beliefs, theory of knowledge and Values. Ideology is partial truth presented as if it were universal truth. 2000 BC, 620 BC, c644

Idols of the Mind, mislead thinking, Francis Bacon, 1620, 1956, 1975

Ignatius of Loyola, Saint, founded the Order of Jesus/ Jesuits 1539, 1545, 1918

Ignatian: One who can’t say if he is an atheist or atheist until he sees a sufficient definition of Theism, coined by Rabbi Sherwin Wine. 1960s

Iliad, generally attributed to a blind poet named Homer, but not definitely. as important and influential as The Bible and Shakespeare in literature. 900 BC

Imitation of Christ, Thomas a Kempis, "It is much safer to obey than to rule." 1428

Incandescence, light emitted by heating a material to a high temperature.

Incas: pre-Colombian civilization in Peru, p.1, 2000 BC, 450, 1500, 1519, 1532

The Incoherence of the Philosophers, al-Ghazali, 1085


Index of Prohibited Writings, The, the censorship of ideas to protect the livelihood of the Catholic clergy. 1310, 1532, 1545, 1559, 2580, 1601, 1609, 1616, 1637, 1848, 1907, 1966, p.177


Indians / Amerindians, have been mistreated more disgracefully than Black Americans, 1942, 1519, 1541, 1765, 1773, 1830, 1963

Indian Ocean, 1000, 1405, 1433, 1440

Induction, in logic, going from particular premises to a general conclusion, the better the premises, the better the conclusion. A conclusion of an inductive argument is called valid if it follows its premises even though it may be wrong if its premises are faulty. The Problem of Logical Induction: Induction results in probabilities, not certainties. The probability can be near certainty and may in fact be 100% accurate, and certain enough to act on, but not certain by definition. p.1, 425 BC, 335 BC Aristotle, 200, 1020, 1268, 1486, 1500, 1600, 1620, 1687-Newton,1739, 1831, 1824, 1863, 1896, 1920s

Induction, in electricity, either adding or subtracting electrons to a body, 1883, 1877

Indulgence, forgiveness or reduction in a penalty for a sin. Applicable also to dead persons who are in Purgatory sitting out their penalties before they can enter heaven. 1054, 1095, 1300, 1509, 1516-7, 1545, 1687

Industrial Revolution, 1765, 1776, 1800, 1848, 1867

Inertia / inertial: 450 BC, 390 BC, 549, 1331, 1612, 1633, 1687-Newton, 1886, 1905, 1907, 1915

Infallible, incapable of error, 413, 1870

infer / inference, the conclusion of an Inductive argument, the accuracy of which depends on the strength of the premises. Or, a reasoning process wherein one draws conclusions based on available evidence.

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

Ingenhousz, Jan, oxygen in plants, 1779

Ingersoll, Robert G, led the Freethought movement, ‘No man with any sense of humor ever founded a religion.’ p.1, 1095, 1532, 1751, 1870

Innocent 2, Pope, convoked 2nd Lateran Council, 1139

Innocent 3, Pope, promoted crusades, 1198, 1202, 1208-9, 1215,

Innocent 4, Pope, Ad extirpanda, authorized torture for possible heretics, 1252

Innocent 8, Pope, Summa Desidantes, 1484, 1486, 1492

Innocent 10, Pope, 1648

Inoculation, an injection of a mild disease prevents a worse one. Used by Turkish peasants for centuries. Used also in ancient China. Suggested to Dr Jenner by Lady Montagu who had lived in Constantinople. 1770s, 1796, 1862

Inquiry Concerning Moral Good and Evil, Francis Hutcheson, 1725

Inquisitions, Christian institutions established to punish heretics with torture, murder, and/or imprisonment for having or expressing unapproved ideas. Continued by the Catholic Church after the Reformation Roman, Spanish, Portuguese, 1184. 1215, 1229, 1233-4, 1273, 1305, 1317, 1440, 1478, 1500, 1519, 1325, 1536, 1542, 1553, 1560, 1600, 1614, 1619, 1633, 1655, 1689, 1820s, 1887, 1996

Intelligent Design, crude re-write of the Teleological Argument, See God, arguments for, this Index described by federal judge John Jones as “breathtaking inanity.” 1987, 2005

International law, Hugo Grotius, 1536, 1625, 1750

International Politics. Frederick Schuman, 1532

Intracellular Pangeneses, de Vries, 1899

Investiture dispute, in Medieval times, who gets to appoint clergymen, the Church or kings, 1054

Ionization: when an atom gains or loses an electron Irenaeus, bishop, gospels were divinely inspired, AD 177, 1751

Iron Age, followed the Bronze Age, c11000 BC

Iron law of wages, 19th century, wages will always revert to subsistence wages, a rise in wages will cause an increase in population that causes wages to go down. (irrelevant today) described by Brit banker
David Ricardo and was used by the ruling classes to justify paying low wages., 1817

Irrational number, a number that can't be expressed as a fraction.

Is anything permanent? Thales's question, 600 BC

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, St., Archbishop of Seville. 591, 789

Israel, Jewish god/teacher whose followers founded Jesuits, 1414, 1529, 1545, 1609-10, 1619, 1624, 1631-3,

Isaac, son of Abraham, reputedly spared from being sacrificed. c2000 BC

Isaiah, 586 BC

Jesus, Jewish ish rabb i/teacher whose followers founded the official Roman Catholic Bible, 405

Jehovah, St., translated Bible from its original Greek (and some Aramaic) into Latin, Vulgate Bible, now the official Roman Catholic Bible, 405

Jefferson, Thomas, 2nd president, Declaration of Independence, deist. "Reason and free inquiry are the only effectual agents against error." 1532, 1624, 1685, 1748, 1776, 1785, 1798, 1800, 1945

Jenkins, Alejandro, physicist, 2011

Jenner, Edward, doctor, inoculation, 1770s, 1796, 1862

Jerome, St., translated Bible from its original Greek (and some Aramaic) into Latin, Vulgate Bible, now the official Roman Catholic Bible, 405

Jesuits, 1414, 1529, 1545, 1609-10, 1619, 1624, 1631-3, 1644, 1670, 1710, 1733, 1736, 1779, 1941, 1956

Jesus, Jewish rabbi/teacher whose followers founded the Christian religion, 188 mentions herein.

Jesus, numerous mentions herein.

Jews, actions against and criticism of, 900 BC, 586 BC, 168 BC, 67, 70, 200, 321, 325, 400, 413, 538, 550, 624, 644, 683, 1096, 1146, 1179, 1182, 1215, 1290, 1306, 1347, 1421-2, 1492-3, 1536, 1533, 1560, 1648, 1751, 1759, 1795, 1820s, 1823, 1830, 1864, 1883, 1944

The Jews and Their Lies, Martin Luther, 1543

Jezabel, Phoenician wife of Ahab, 9

Jihad, struggle to spread Islam.

Job / Book of Job, Hebrew Bible, God killed Job's children to win a bet with Satan. Man can't understand God, an agnostic argument, 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, p. 179

John 22, Pope, issued a bull, Spondent pariter to squelch alchemists, but crippled real chemistry, 1317

John 23, one of three popes in 1409

John 23, Pope. 1948, 1963

John Duns Scotus, separated dogma from science, benefitting science 1290

John Paul 1, 1978, populist pope, likely murdered, 2013


John, King of England, was forced to sign the Magna Carta, granted habeous corpus, trial by jury, and certain rights to nobles, 1215

John, Saint, Gospel of John, 30, 70, p. 179

John the Scot. See Johns Scotus Eriugena

Johnson, Lyndon Baines, U.S. president, p.176

Johnson, Samuel, Dictionary of the English language, 1710, 1755, 1925

Joshua. According to the Bible he ordered the Sun to stand still, 1543

Joule, James, thermodynamics, 1840, 1846-7, 1852

Joule, a measure of energy. 1846

Joule's Law, the amount of heat produced by an electric current flowing along a conductor is directly proportional to the square of the Current. Like Ohm's Law, it expresses a special property of certain materials rather than a general property of all matter, 1840

Judea, area roughly present Israel, 586 BC, 268 BC

Julian, a general under Constantine, expressed the Small God Problem, 363

Julian, bishop of Eclanum, criticized Augustine's application of Original Sin to infants, 413

Julian calendar, 50 BC, 1513, 1582

Julius Gaius, Caesar, killed by Anthony and Brutus in 44 BC, 65 BC, 50 BC, 44 BC

Jung, Carl, psychiatrist, contrary to Freud, sex is not all-important, the inherited collective unconscious is.

Juno: Roman goddess of fertility

Jupiter, planet, 150, 1610, 1670, 1676, 1968

Jupiter, principal Roman god. (Greek Zeus), 449 BC

Just War principle, 400 BC, 413, 1273, 1509, 1536, 1945

Justinian, Roman emperor, 529

Justinian Code, 538, 628, 1076, 1088, 1500,

Abu Ubayd al-Juzani's The Tarik al-Aflak 1070 which pointed out the "equant" problem (irregularities in planets' orbits) of Ptolemy's concept of the universe. 1070

K

Kames, Lord, see Henry Home, Scot, judge, philosopher, 1725, 1734, 1777

Kant, Immanuel, Continental realism, German idealism, Critique of Pure Reason 1781, Critique of Practical Reason (Categorical imperative) 1788, Critique of

Kelemen, Deborah: Children tend to think that things happen for a purpose. The real question is, why do children think things have purposes? 2011

Kelvin, Lord / William Thomson, eminent Scottish physicist at Glasgow, named Lord Kelvin in 1892, (in 1884, erred in believing that aluminiferous ether was 'the only substance we are confident of in dynamics.'), 1802, 1846, 1848, 1852, 1865, 1892, 1897

Kelvin scale of temperature, degrees the same value as Celsius but 0 degrees Kelvin is minus 273.16C.

Kepler, Johannes, The New Astronomy 1609, On the Motions of the Planet Mars 1609, planets orbit the Sun in ellipses, close to circular, 1543, 1577, 1600, 1609, 1613, 1616, 1633, 1650, 1657, 1676, 1684, 1686-7, 1768, 1962,

Kepler Spacecraft, p.182+ Astronomy Timeline


Khadija, first wife of Muhammad, 610

Ibn Khaldun, Introduction to History, formulated a theory of the rise and fall of states, 1377

al Khwarizmi, Muhammad bin Musa, algebra, 825, 1085, Kierkegaard, Soren, founded existentialism 1846

al Kindi, Yakub, chemist, rejected alchemy c865

King James Version of the Bible, widely used English version of the Bible, 1611

Kipling, Rudyard, Brit, very popular (& good) writer, Gunga Din, The Ladies (For Judy O'Grady and the colonel's lady are sisters under their skins), Kim, Barrack Room Ballads, The Ballad of East and West, The White Man's Burden, Tommy, The Jungle Book, Mandalay, "The female of the species must be deadlier than the male." 1847

Kirchoff, Gustav, with Robert Bunsen, built first spectroscope in 1859, saw that elements emit specific wave lengths, 1859, Timeline, p.182+

Knight, Joseph, a slave in Jamaica whose owner took him to Scotland sued for his freedom. Lord Kames, speaking for the Court of Session freed him, stating, "We sit here to enforce right, not to enforce wrong." Jamaican law, being here unjust, could not be supported in Scotland. The decision's importance was that the judges decided the case based on reason to assert a basic principle of equity and justice, not precedent. 1777

Knowledge: 1. understanding information (Einstein), 2. justified true beliefs. It can be divided into different "cognitive fields," such as physics, biology, aeronautics, etc., more certain than beliefs, which most men act on as if it were. p.1

Knowledge is power, common paraphrase of a statement of Francis Bacon, 1600 (Paul Krugman: Knowledge is not power. Power is power.)

Knox, John, brought Calvinism to Scotland. It became Presbyterianism in the U S. 1560

Koheleth, teacher, wrote Ecclesiastes, 250 BC

Kohlrusch, Rudolph, electrolytic conductivity, 1839

Kopp's law, 1864, the heat capacity of a molecule is the sum of the heat capacities of its constituent elements.

Kohn, Hans, Nationalism dates from c1750


Kowalska, Maria, first in the Index of Prohibited Writings, then a saint, p.179

Kramer, Henrich, Dominican, OK to torture people who may be witches 1484

Krauss, Lawrence, atheist, A Universe from Nothing, Why There is Something Rather than Nothing. 2012

Krishna, Lord, Hindu god, 2000 BC

Kublai Khan, grandson of Genghis Khan, 1200, 1289, 1292

Knowledge is not power. Power is power. (i.e., unimpeded by government regulation), 1776

Land reform, "If a man owns land, the land owns him." Ralph Waldo Emerson, 1869, 1872, 1879

Landsteiner, Karl, discovered blood groups, 1901

Lao-tzu, Tao is the energy of the universe, 350 BC

Laissez faire, French for "Let it (business) go forward" (i.e., unimpeded by government regulation), 1776

de Lafayette, Marie-Joseph Paul de Motier, Marquis, French general in American Revolution and figure in The French Revolution, 1776, 1789

de Lagrange, Joseph-Louis, Compte, astronomer, 1799

Lama, Buddhist monk or priest

de Lamarck / Lamarckism, Jean Baptiste, Pierre Antoine de Monet, philosophe, Zoologie, proposed that offspring inherit traits developed by their parents during their lifetimes. Darwin at first bought it, but later discarded it, 1809, 1859, 1863, 1899

Lavoisier, Antoine, book on medicine by Muhammad ibn Zakariya al-Razi, c900

Large Comprehensive, The, book on medicine by Muhammad ibn Zakariya al-Razi, c900

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.177

Last Supper 1498, painting by Leonardo da Vinci, 1486, 1517

LeVey, Anton Szandoz, Satanist, Satanist Bible, 1986

Lavoisier, Antoine, Elementary Treatise on Chemistry 1789, he deduced Water was H2O,
Lavoisier, Marie-Anne, wife of Antoine, learned English to translate for him, assisted him immensely, 1789

Lawrence, D H, writer, *Lady Chatterley's Lover*, p. 179

Laws of nature / natural laws, a statement that describes, predicts, and explains how phenomena behave in nature. 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 better law that provides better explanations or predictions. Paine in 1795: “Man does not make them, he only discovers them.”

Laws of thought, basic, 335 BC-Aristotle, 1160, 1748, 1751, 1819, 1905,

Lazarus, Emma, inscription on the Statue of Liberty dedicated, “Give me your poor, etc.” 1886

Lazarus, reputed to have arisen from the dead, 1864

Leavitt, Henrietta devised a way to determine distance to objects far away. She saw a correlation between the brightness of a certain class of variable star, a Cepheid variable, found in spiral galaxies, and the period of the variation. The brightness of a star depends in its distance to Earth. 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 used this method. 1908, *Astronomy Timeline*, p.182+

Van Leeuwenhoek, Antoine, Dutch, built a powerful one lens microscope with a lens of a droplet of molten glass, founded microbiology. 1600, 1673

Legal positivism, the theory of positivism as applied to the law. Law is simply the enforceable commands of government; there are no religious or normative values to test it.

von Leibniz, Gottfried, Baron, discovered calculus at same time as Newton, *Essais de theodicee, Monadology 1714, The Principles of Nature & Grace Based on Reason* 1714, “Why is there something rather than nothing?” 300 BC, 413, 1076, 1273, 1600, 1607, 1687-Newton, 1697, 1710, 1714, 1735-6, 1751, 1759, 1779, 1800, 1808, 1900s, 1912

Lemaître, Georges, priest, astronomer, said the expanding universe started 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, 1929-30, 1948, 1950

Lenz, Heinrich, electricity theoretician 1833

Leo 3, Emperor, ordered religious images/ icons destroyed, 433-4

Leo 9, Pope, presided over the final split between Rome and Constantinople 1054

Leo 10, Pope, Giovanni de Lorenzo de Medici, son of Lorenzo the Magnificent, sold indulgences to build St Peter's basilica, 1513, 1515-6

Leo 12, Pope, required Jews to wear distinctive dress 1823

Leo 13, Pope, *Aeterni Patris testem benevolentiae, equal toleration of all religions...is the same thing as atheism 1879, 1885, 1891, 1893, 1899

Lettres philosophiques, Voltaire's descriptions of English thought to Frenchmen, 1733

Leucippus, posited the atomic theory, his pupil, Democritus, furthered it. 450 BC, 430 BC, 335 C, 1808

Levellers, British utopian group, John Lilburne c1643

Leviathan, Thomas Hobbes, “Life in nature is solitary, poor, nasty, brutish, and short.” 1651

Lewis, Sinclair, American social critic, *Main Street*, 1920, *Babbitt* 1922,

Leyden jar, primitive battery, Musschenbroek, 1745

Libby, Willard, discovered carbon dating c1940

Lichtenberg, Georg C, German philosopher, 2400 BC

Life and Spirit of Spinoza, The, a/k/a The Three Impostors, a compendium of doubt. 1719

Life of Jesus, August Renan, Jesus was a good man, but not divine, 1863

Light, that portion of the electromagnetic spectrum visible to humans. Like all electromagnetic waves, travels thru space at 300,000 kilometers /sec, 230+ mentions herein.

Light year, distance an electromagnetic wave, including light, travels in one year, c5.9 billion miles or c9.5 B 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, in 1747 experimentally discovered citrus fruits cured scurvy, recommended it to the Navy in 1757. In 1795, the Navy adopted it. 1757

Linde, Andrei, eternal multiverse hypothesis.

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, patented first (refracting) telescope, 1585, 1608

Lippmann, Walter, political theorist, “It is perfectly true that the government is best that governs least. It is equally true that the government is best that provides most.” 399 BC

Lisbon earthquake & tsunami, 1755, destroyed most of Lisbon, its most important churches, and killed 10,000-100,000 Catholics in & around Lisbon on All Saints Day, a major Catholic holy day. 1755, 1759

Liu Xin, Chinese astronomer, calculated pi. 136 BC

Lobachevsky, Nicolai, non-Euclidean geometry 1826, 1796, 1826, 1915

Locke, John, British political theorist, father of classical liberalism, *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 at the time), p.1, 1586, 1600, 1624, 1633,
Logical fallacies, logical errors in argument, 335 BC- Aristotle, 1687-Newton, 1779, 1929, 1955, (p.190 examples)

Logical positivism, An idea is cognitively meaningful only if there is a way to prove or disprove it. 1930- Compte, 1912-Whitehead, 1922-Wittgenstein, 1936-A J Ayer

Lokayata, ancient Indian materialistic doctrine, its adherents were the Carvaka, 620 BC, 600 BC

Lorentz, Hendrik, physicist, developed equations for the compression of time and space in electromagnetism. Einstein said his theories of relativity were based on Lorentz's and Mach's work, 1886, 1900, 1905

Lorini, Niccolo, friar, criticized Galileo 1613

Louis 14, French 'Sun king," 1650, 1685
Louis 15, French king, 1770, 1733, 1751, 1780
Louis 16, French king, beheaded. 1793
Lucian of Samasota, Roman atheist, 150 BC
Lucius 3, Pope, Ad abolendam, inquisitions, 1184

Lucretius, Titus Carius, atheist, atomist, On the Nature of Things 58 BC, 1473, 1580, 1826, 1859

Luke, Saint, First Century AD, gospel of, 1300 BC, 30, 40, 70, 177, 200

Ludwig, Christoph Ernst, anti-Darwin, 1860

Luther, Martin, Lutheranism / Lutheran. Luther started the Protestant Revolt / Reformation, Disputation on the Power and Effect of Indulgences (aka The 95 Theses) 1517, On the Jews and Their Lies. 45, 1095, 1376, 1516-7, 1519, 1525, 1527, '536, 1543, 1546, 1555, 1689, 1748, 1850, 1973

Lyell, Charles, Brit., prominent geologist, Principles of Geology 1830-3, Geological Evidences of the Antiquity of Man-1863, 1830-2, 1858-9, 1863, 1871

Lyengar, Shanto & Sean Westwood: Prejudice based on political ideology is greater than racial or gender prejudice. 2014

M

M-theory, a family of different theories in cosmology, each of which is a good description of observations only in some range of physical situations. According to M-theory, there are multiple universes, all created out of nothing without a god. Stephen Hawking and Leonard Mlodinow's candidate for the "theory of everything," 2010, 1687-90, 1696, 1700, 1724, 1733, 1739, 1748, 1751, 1773, 1776, 1779, 1781, 1896, 1922,1975

Lockyer, Norman, deduced a dark line in Sun's spectrum was a new element not then known, (later found on Earth), named it helium, 1868

Logic, method of reasoning developed by Aristotle using basic laws of thought and phenomena from the natural world to achieve coherence in statements to reach a general conclusion.

Inductive logic produces conclusions whose truth is not certain but depends on the strength of the premises. Deductive logic uses two or more presumptively truthful premises to reach a presumptively true conclusion. Numerous mentions herein.

Logical fallacies, logical errors in argument, 335 BC- Aristotle, 1687-Newton, 1779, 1929, 1955, (p.190 examples)

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Ludwig, Christoph Ernst, anti-Darwin, 1860

Luther, Martin, Lutheranism / Lutheran. Luther started the Protestant Revolt / Reformation, Disputation on the Power and Effect of Indulgences (aka The 95 Theses) 1517, On the Jews and Their Lies. 45, 1095, 1376, 1516-7, 1519, 1525, 1527, '536, 1543, 1546, 1555, 1689, 1748, 1850, 1973

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M-theory, a family of different theories in cosmology, each of which is a good description of observations only in some range of physical situations. According to M-theory, there are multiple universes, all created out of nothing without a god. Stephen Hawking and Leonard Mlodinow's candidate for the "theory of everything," 2010,
always a struggle for food 1798, this concept inspired Darwin, 300 BC 1798, 1817, 1838, 1855, 1859

*Man is the measure of all things*, Protagoras. c450 BC (Socrates: That’s vain.)

Man: mankind, humans, *Homo sapiens*, people, persons, human beings, “man,” depending n the context, refers to mankind or an adult male.

*Man’s Place in Nature*, Thomas Huxley, 1860

Mandeville, Bernard, Dutch/English, Society is rightly based on the rich exploiting the poor, 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, the universe.

Manu, Hindu progenitor of Man. The *Code of Manu*, Men own women, c400 BC

Manutius, Aldus, Venetian printer, scholar, 1514

Marcion, Roman Christian Jew, founded Marcionism, said harsh Hebrew scriptures were inconsistent with Jesus’ teachings, so discard them. This was not adopted. 150, 200, 321

Marconi, Guglielmo, wireless radio 1895, 1860

*Electromagnetism Timeline*, p. 136

Marcuse, Herbert 1968. 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.

Marduk, Babylonian god, c1750 BC

Marlowe, Christopher, *Tragical History of Dr. Faustus*, *The Jew of Malta*, 1633, 1808

Mars, planet, 150, 1609, 1656, 1672, 1968, 1973

Mars, Roman god of war, 753 BC

Marshall, Thurgood, US Supreme Court Justice, 1936, 1941

Marsiglio of Padua, advocated the Church act democratically, no success, 1324, 1331, 1776

Martel, Charles, king of the Franks, 732, 753

Martin 5, pope, 1414

Marx, Karl, & Friedrich Engels, wrote the *Communist Manifesto* 1848, *Das Kapital* 1867. My philosophy’s creed is, I detest all the gods. 1820s, 1848, 1859, 1867, 1881, 1975,

Mary, Saint, mother of Jesus, 70, 475-6, 787, 1517

Mary, Queen, wife of William of Orange, 1688

Mary, daughter of Henry 8 by Catherine 1, became Queen for a time, murdered many, so named Bloody Mary, 1533

Mason, George, *Virginia Declaration of Rights*. 1776

Mass, in physics, the quantity of matter in a body as distinct from weight (weight is gravitational attractive force which varies depending on the size of the other body such as a planet, that attracts it. The gravitational attraction of an object on the moon is less than for that object on Earth.).


Mass, Christian religious service, 1054, 1150, 1517, 1563, 1759

Mass-energy, Einstein, mass and energy are different forms of mass-energy, 1687-Newton, 1714, 1783, 1905, 2000, 2006, 2009


Massachusetts, 1607, 1641, 1670, 1739, 1765

al Masudi, 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, 430 BC, 425 BC, 1651, 1848, 1881, 2000

Mathematics, a tautological science, the relationships among amounts (of numbers, distances, things, apples, dollars, velocities), 163 references throughout

Matrix Mechanics, a formulation of quantum mechanics that does not involve a wave function. Werner Heisenberg, 1927

*Matthew, gospel of*, 1300 BC, 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 B

Maximilian, HR emperor, authorized burning the *Talmud* 1515

Maxwell, see Clerk-Maxwell, James

*Maxwell’s Equations*, the fundamentals of electromagnetism, *Electromagnetism Timeline*, p. 135

Mayan civilization, 6000 BC, 2000 BC, 1046 BC, 200, 250, c776, 1519

Mayr, Ernst, evolutionary biologist, 1871, 1972


Mead, Margaret, anthropologist 1970

Mechanics; a branch of physics. The study of the interrelations of force, matter, and motion.

de Medici family, bankers and leading citizens of Florence, 1397, 1450, 1453, 1657

de Medici, Catherine, mother of French Henry 4, 1572
de Medici, Cosimo, ruler of Florence, 1450
de Medici, Giovanni, son of Lorenzo the Magnificent, cardinal at age 13, became Pope Leo 10. c1484
de Medici, Leopoldo, a layman, Alexander 7 made him a cardinal to weaken his scientific academy, 1657
de Medici, Lorenzo the Magnificent. Ruled Florence, father of Pope Leo 10. 1532


Mein Kampf/ My Struggle 1928, Adolph Hitler, 1966

Melanchthon, Philip, World created in 3963 BC. 1650

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
Mencken, H L, author, critic, 300 BC, 1765, 1896, 1925,角度
Mendel, Gregor, monk, 1865, father of genetics, 1899
Mendeleev, Dimitri, Russian, devised periodic table of
elements arranged by atomic weight, 1869; in 1914
corrected to be arranged by 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, 3400 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, friar, disseminated scientific
knowledge 1633, 1687
Meslier, Jean, French philosophe, 1751
Messier, Charles, published a catalog of comets and
cloudy points in the heavens which he called
nebulae (clouds), then known as Messier objects,
which were later found to be galaxies. 1774, 1912, 1924
Metaphysical / Metaphysics, the study of being as
being, speculation about the meaning of what is,
the study of first principles and first causes, the
rational knowledge of those realities that go
beyond us, 504 BC, 425 BC Socrates, 387 BC-
Plato, 335 BC-Aristotle, 300 BC-Epicurus, c910-
al-Razi, c1000-Avicenna, 1273-Aquinias, 1331-
Ockham, 1624-Herbert, 1637-Descartes, 1651-
Hobbes, 1657-Vatican, 1670-Spinoza, 1739-Hume,
1755-Kant, 1820s-Hegel, 1830-Compte, 1912-
Meteorite, any part of a meteor that hits the Earth.
6000 BC, 1100 BC, 450 BC, 196
von Metternich, Count, Austrian, Council of Vienna,
1815
La Mettrie, J O, Belief in the existence of God is as
groundless as it is useless. The world will
never be happy until atheism is universal. 1748
Meucci, Antonio, telephone 1871, Timeline, p. 136
Michel 1, Patriarch in Constantinople c1054
Michelangelo Buonarriti, towering intellect, painted the
Sistine Chapel, 1478, 1512
Michell, John, posited black holes 1783, 106, 137, 158
Michelson, Albert, and E W Morley calculated the
speed of light, and said one can’t measure
speed of Earth through space as there is no
reference point. In 1894, he said, “It seems
probable that most of the grand underlying
principles of physical science have been firmly
established.” 1879
Microbiology, van Leeuwenhoek, 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.” 300 BC
Milgrom, Morphadei, proposed a modified calculation of
gravity which obviated the need for dark matter
1983
Milky Way, a galaxy of c100B 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 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,
Mill, John Stuart, A Study of Logic 1843, On the
Enfranchisement of Women 1851, On Liberty
1859, Utilitarianism 1863, On the Subjugation of
Women 1869, Theism 1874 Auguste Compte and
Positivism. 300 BC, 1859, 1863-Utilitarianism, 1874-
Theism, 1973-Anthropic
Miller, Stanley, physicist, recreated Earth’s ancient
atmosphere, found amino acids, 1952
Millikan, Robert, physicist, Nobel prize, 1931
Milton, John, poet, 1896, p. 179 The Index
Mind, the human mind, the functional and subjective
aspect of the living brain. Two as yet unresolved
schools of thought are whether the mind and body
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 throughout.
Ming Dynasty (1368-1644), 1500
Miracle, an event done by a deity that violates natural
laws. August Renan, “No miracle has ever taken
place under conditions which science can accept...miracles only occur at times and in
countries where miracles are believed in, and in the
presence of people who are disposed to believe
them.” Indian Basava Premanand spent a lifetime
looking for miracles among the gurus and godmen
in India and never found one that he couldn’t
duplicate using tricks. The Catholic Church is a
principal patron and advocate of miracles in the
modern world. Praying-to God to give one
something is asking for 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, 1085, 1735, 1748, 1779, 1808, 1863, 1947,
1973, 1997-8, 2013
Miracles, Argument from, Only a god can make a
miracle, see God, arguments for, this Index, AD 45
Miranda, Giovanni Pico della, Dignity of Man 1486,
p. 179-The Index.
Misanthrope, le, La Tartouffe, 1664, Le Bourgeois
Gentilhomme, Moliere, satirized hypocrites, 1670
Miserables, Les, 1862, Victor Hugo, 1847
Mitchell, Walter, Rev., anti-Darwin 1860
Mithra / Mithraism, sect of the Persian god Mithra, 2400
BC, 620 BC, 300 BC, AD 30, 150, 200
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
Molecule, a group of atoms bonded together. It is the smallest part of a substance that retains the chemical properties of the whole.


Momentum, the measure of a moving body to resist forces acting on it, \( M = \text{mass} \times \text{velocity} \).

Momentum is 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 article apparently resting on the ground may be considered not moving; however relative to the center of the Earth is moving Eastward so that, if it were on the equator, it would be moving c1,000 mph, 24,000 m/day, like all objects on the equator, with correspondingly lesser velocities down to the poles, where it is just revolving. Correspondingly, an object on the equator moving Westward c1,000 mph relative to the ground, would be stationary relative to the center of the Earth. c1000, 1664, 1670, 1687-Newton, 1736, 1927

Mona Lisa, Leonardo da Vinci, 1486

Monadology, von Leibniz, 1714

Monism, any view claiming to find unity in a certain sphere where it might not have been expected.

Monotheism, belief that there is a god and only one. George Santayana: Monotheism seems to me to be quite strongly as cause and effect, with intolerance. p.1, c1360 BC, 150, 230, 1800


Montanari, Geminiano, in 1656 discovered a variable star, *Astronomy Timeline*, p.182+

de Montesquieu, Baron, 1748 *Spirit of the Law*, 1700, 1721, 1748, 1751, 1776

Montezuma, Aztec king, murdered by Cortez, 1519

Montgolfier, Joseph and Jacques, powered hot air balloon, 1783.

More, Thomas, Lord Chancellor, Catholic, *Utopia*, murdered by Henry 8, 1509, 1516, 1533


Morley, E W, with Michelson, calculated speed of light, 2000

Mormon / Mormonism / Moroni: religion founded by Joseph Smith, then led by Brigham Young to led Jews from Egypt, c1300 BC, 586 BC, 274, 321, 622, 1160, 1160, 1517, 1670, 1719, 1748, 1864-5.


*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 \times acceleration / deceleration. 3rd law. *Reaction*. For every action there is an equal and opposite reaction, *Principia*, 1590, 1612, 1664, 1666-Hooke, 1684, 1687, 1907

Motion, planetary, see Planetary motion this index

Motion, Brownian, 1886, 1905,

Motion, relativity (see discussion on momentum above) 1886-Mach, 1879, 1905, 1907, 1915-Einstein,

Motion, wave motion, see Huygens, this index

Motion, absolute motion of Earth through space isn’t measurable (as no reference point), 1879

Motion, geocentric planetary motion, see Geocentric, this index

Mo-tzu, Chinese philosopher, 450 BC, 1687

Mozart, Wolfgang Amadeus, Austrian, prolific composer, *Don Juan*, died young, penniless,1787

Mueller, Johann, astronomer, *Epitome*, 1464


Muhammad ibn al-Wahhab, founded an extreme Muslim sect, *Wahhabism*, 1740

Muhammad ibn Zakariya Razi/ al-Razi, astronomer, see al-Razi

Mukhanov, Viaчestav, with G V Chibisov, quantum fluctuations could lead to large structures in space, 1981

Mueller, H J, American geneticist, Nobel laureate, said even educated persons did not understand natural selection 100 years after Darwin, 1959

Multimodal theory of intelligence, Intelligence is made up of several different mental abilities, as opposed to the more generally accepted theory of one basic measure of mental ability “G”, which tends to measure the average of specific areas of intelligence.

Muslim / Islam, numerous mentions starting at 610

van Musschenbroek, Pieter, Leyden jar, 1745

Mutual assured destruction (MAD), balance of terror, theory that no state will drop a nuclear bomb on another state which has nuclear capability as both would then be destroyed. It assumes the possessors of nuclear bombs act rationally.

Mutation theory, Hugo de Vries, New species, new forms of living things can occur suddenly 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 fitness to survive, i.e., natural selection. 1900

Myth, stories about the origin or characteristics of nations, tribes, persons, or other groups, or simply a false belief.

N

ibn al-Nafis, examined and described the heart, 1242

Nahmanides, Universe may be expanding, 1250

Naive literalism, phrase used by Augustine to denote believing that the Bible always means what it plainly says, 410
Names of God, The, Pseudo-Dionysus, c500
Nanak Dev, guru, founded Sikhism, c1499
Napoleon Bonaparte, see Bonaparte
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, c1750, 1768, 1772-Herder, 1933-Einstein

Natural History of Creation, Ernst Haeckel, popularized Darwinism, 1862

Natural law / law of nature, a statement that describes, predicts, and explains how phenomena behave in nature. see laws of nature

Natural rights, popular and admirable but ambiguous concept of rights inherent to people, not given by a ruler or a god. Such rights vary by culture and by prevailing ideology and are thus not “natural,” but are man-made (Locke, Hobbes, Mill). 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 Declaration of Independence and the Constitution did not consider women or slaves to have the same “natural rights” as white males. 1625-Grotius, 1689-Locke, 1776-Locke, 1790-Burke, 1859-Mill

Natural monopoly, industries where a single provider can provide a service or product at a lower cost than competing firms, such as providing electricity, natural gas, or water where the delivery costs are high in comparison to the substance delivered.

Natural selection, name chosen by Darwin to explain his theory of evolution to distinguish it from artificial selection / eugenics, then (and now) used by farmers to improve breeds. 1779-Hume, 1832, 1838-Darwin, 1844-Darwin, 1855-Wallace, 1858-9-Darwin, 1831-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, the inference is that God must have caused the previously unexplained phenomena in the natural world, 335 BC-Aristotle, 1273-Aquinas

Naturalism, atheistic theory of the world / there’s no evidence that there’s anything beyond natural laws, AD 50-Wang Ch‘ung, 550, 1140, 1670, 1885-Leo 13, 1993-Plantinga

Neanderthal, either a sub-species of Homo sapiens or a different related species. As they interbred with Homo sapiens to a slight degree, would be considered a sub-species. Extinct c30,000 BC

Nebraska, (cloud) original name for galaxies when galaxies were thought to be cloudy blobs within the Milky Way, i.e., before galaxies were known to exist apart from and beyond the Milky Way Galaxy. Nebular theory of planetary formulation, proposed independently by Kant and Laplace, that the primaeval universe was a chaotic nebulous cloud of dust specks and particles that gradually began to coalesce by gravity to form stars, planets and galaxies. 1734-Swedenborg, 1755-Kant

Nebuchadnezzar, Babylon king, exiled Jews. 586 BC
Nehru, Jawaharlal, with Mahatma Gandhi, gained independence for India, 1947
Nemesis, Greek goddess punished the arrogant, 750 BC-Neolithic Age, 11000 BC, 5000 BC, 3000 BC
Neoplatonism, 230 AD, one of most important theories in philosophy and history. Neoplatonism claimed to interpret Plato and to reconcile Plato with Aristotle. Reality is seen as hierarchically ordered, having at its apex a spiritual entity, which is ineffable and unknowable and can be described only negatively, 230-Plotinus, 413-Augustine, 862-Eriugena, 1000-two truths?, 1190-Maimonides, c1450-Cosimo de Medici

Nernst, Walter, formulated the Third law of Thermodynamics, 1906
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 formulated being similarly co-ordinated.

Neumann, Franz Ernst, with Herman Kopp in 1831 discovered the Neumann-Kopp law that the molecular heat (the molecular weight x the specific heat) of a compound is equal to the sum of the atomic heats of its constituent elements.

Neutron, a sub-atomic particle slightly larger than a proton but without any electrical charge. They consist of three kinds of quarks (fundamental particles) which are mediated by gluon. 1860-Avogadro, 1869-Mendeleev, 1919-Rutherford, 1932-discovered by Chadwick, 1934-Szilard, 1950,
Neutron star, compact remnant of a star massive enough to become a supernova but not so massive that a black hole develops.

Neutrino, an extremely light elementary particle of almost pure energy, affected only by gravity and the weak nuclear force. Posited first in 1930 by Wolfgang Pauli. Its existence confirmed in 1956

New Astronomy, The, Johann Kepler, 1609
New Republic, The, H.G. Wells, 1908
New Synthesis, The, Edward O Wilson, 1975
New Testament, The, name given to those writings of early Christians 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 Bible. 900 BC, 45-Paul, 70, 200-finalized, 1525, 1793-Paine, 1847-Bierce, 1864, 1893-Leo 13
Newlands, John, saw patterns among elements, concept then regularized by Mendeleev, 1869
Newman, Ezra, astronomer 1965, Timeline, p. 182+, Newman, John Henry, Anglican, then Catholic 1876
Newton, Isaac, Universal Arithmetic 1707, calculus 1665, developed concept of gravity, laws of motion, rules for reasoning, “The great ocean of
truth lay all undiscovered before me," p.1, 335 BC-

Aristotle, c825, c1000, 1020, 1590-Galileo, 1600,

1609-Kepler, 1612-Galileo, 1620-Bacon, 1661,

1663-70, 1675, 1683-4-De Motu / On Motion

,1686-7-Philosophiae Naturalis Prinicipia Mathematica/ Mathematical Principles of Natural Philosophy " Principia," 1689-90, 1697, 1700,

1704-Optiks, 1714- Leibniz, 1635-6-Euler, 1783-

black holes, 1799-Laplace, Timeline p. 136, 1871,

1879-80, 1886-Mach, 1896, 1900, 1907, 1913-

relativity, 1918-9- gravity, 1926-quantum, 1927,

1962-Kuhn, 1973
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, Astronomy Timeline p. 182+
Nicholson, William, electrolysis, 1800
Nicolas of Kues, cardinal, Reconciliation of Opposites.
Earth may not be center of the universe, 1644,
Nicolas of Oresme, astronomer, predecessor of
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."
Nietzsche, Frederich, Also Sprach Zarathustra,
Beyond Good and Evil, "The two great European
narcotics, alcohol and Christianity." 1883
Nihilism, term popularized by Ivan Turgenov in 1861 for
the rejection of all traditional values, 1883
1984, by George Orwell, portrayed a totalitarian future, 1947
Ninety Five Theses, Martin Luther, 1517
Nintu, Sumer Earth goddess, 5000 BC
Nirenbeg, Marshall, Robert Holley, & Har Khorana
isolated transfer RNA & determined the sequence & structure of alanine tRNA, the molecule that incorporates the amino acid alanine into proteins. 1964
Noah, In the 1700s, Noah's ark was claimed to be six
times larger than originally calculated, after too
many new species were discovered to fit the old
ark (theologians in action), 586 BC, 1769, 1864
Nominalism, theory that concepts, abstract terms, or
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, 134, 136-7, 186
Nova theoria lucis et colorum, Leonhard Euler, light's
diffraction is best described as a wave, 1736
Novum Organum, Francis Bacon, 1620
Nuclear winter theory. View that after a nuclear war,
there would be so much dust in the atmosphere
blocking the Sun's rays that the Earth would become extremely cold with catastrophic
consequences.
Numbers, Ronald, advocate for Creationism, see
Creationism, this index.
Oath of Abjuration, of Holland from Spain 1581, 1776
Obstacles to truth, Roger Bacon, 1271
Ockham, William of, Franciscan, skeptic, Ockham's
Razor c1331, cut away irrelevant arguments, 1331,
1524, 1590, 1633, 1687, 1869,
Octavian, with Antony, murdered Cicero c43 BC
Odyssey, Greek epic attributed to Homer, c900 BC
Oersted, Hans Christian, 1820, electricity &
Magnetism are both aspects of one
phenomenon, electromagnetism, 1785-1840
Electromagnetism Timeline p. 123
Of Civil Liberty, David Hume, first use of phrase, a
Government of laws, not of man, 1742
Ogilvie, William, Scot, philosopher, land reformer,
The Right of Property in Land 1782
Ohm, George, 1827 discovered Ohm's law that
voltage = current x resistance, 1785-1840
Electromagnetism Timeline p. 123
Old Testament, see Hebrew Bible
Oldham, Richard, earthquake waves, 1906
Oligarchy, system of government wherein power is
vested in a few persons or families, such as the
Roman Republic, Saudi Arabia, Guatemala, Incan
Peru, and many other countries, 387 BC
Olmec, first Mexican civilization, 6K BC, 1300 BC
Omar / Umar, second caliph, powerful, 642
Omar Khayyam (A loaf of bread, a jug of wine,
etc), solved cubic equations, 1066
Omnipotence Paradoxes, see God, arguments against
this index, AD 414
On Divine Omnipotence, Cardinal Damian, 1059
On Duties, Cicero's last book, 44 BC
On Experimental Science / Scientia Experimentalis,
Roger Bacon, 1267
On Liberty, John Stuart Mill, 1859
On Motion / De Motu, 1590, unpublished work by
Galileo, 1684, (also title of a work by Berkeley)
On Nature, Anaximander 590 BC, 350 BC
On the Equilibrium of Heterogeneous Substances,
Willard Gibbs, thermodynamics, 1875
On the Immortality of the Soul, Pietro
Pomponazzi, 1516
On the Infinite Universe and Worlds, Giordano
Bruno 1586,
On the Magic of Demons, 1563
On the Nature of the Gods, Cicero, c45, BC
On the Nature of Things, Titus Lucretius,
atheistic explanation of events, 58 BC
On the Principle of Population, Thomas Robert
Malthus 1798, revised several times from 1798 to
1830s, inspired Darwin and Wallace, 1838
On the Subjection of Women, John Stuart Mill, 1869
Ontology, the study of the nature of being, existence or
reality, the search for a rational explanation of the
nature of existence.
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
Optics, p.1, 711, 1020-al-Haytham, 1085-Toledo, 1225,
Oxygen / Oxidation: burning, chemical combining a substance with oxygen, from paper yellowing with age to rust to fire to an explosion, 1665, 1775.

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.

Orwell, George, pen name of Eric Blair, "1984, a bleak allegorical novel that ridiculed the Soviet system. "Men exploit animals as the rich exploit the proletariat....All animals are equal, but some animals are more equal than others." At the Soviets' request, the US Army collected copies of Animal Farm to give to the Soviets to be burned. 1945. 335 BC-Aristotle, 1532, 1880, 1949

Osiander, Andreas, wrote a preface to Copernicus's Revolutions saying heliocentrism is just a speculation, 1543.

Osiris, Egyptian god, believed to have died and resurrected, 4000 BC, 3400 BC, 2400 BC, 300 BC, AD 30, 45

Ostrogoths, invaded Roman Empire 5th century, 410

Otis, James Jr., God made all men naturally equal, taxation without representation, 1761

The Outline of History, H. G. Wells, 161

Ovid, Roman poet, The Art of Love, cAD 8

Owen, Robert, Brit, utopian social reformer, 1800

Owen, Richard, prominent foe of Darwinism, 1859

Oxygen / Oxidation: burning, chemical combining a substance with oxygen, from paper yellowing with age to rust to fire to an explosion, 1665, 1775.

P

Paganism, classical religion of Greece and Rome, numerous anthropomorphic gods with specific areas of power. In modern use, derogatory term for worship of a god or gods purportedly less sophisticated than those of the speaker, c900 BC, c750 BC-Greek gods, 586 BC, 500 BC, 399 BC Socrates, 45, 83, 200, 230, 321, 325, 410-Rome falls, 413-Augustine, 475-6, 520, 529, 538, 550, 610, c1095, 1140, 1452, 1754, 1759-Voltaire

Paine, Thomas, Brit., major pamphleteer and inspiration for the American Revolution, "A hereditary head of state is as absurd as a hereditary physician or a hereditary astronomer." He was also an inventor and designed an iron bridge to span the Skyykill river. 1624-Deism, 1776-Common Sense and The American Crisis, 1779, 1793 and 1795 The Age of Reason, 1797-Agrarian Justice.

Paleolithic Age, 700,000 BC, 30,000 BC

Paleontology, the science of the forms of life existing in earlier geologic periods shown by fossils, 1545, 1796, 1956, 1972, 1996

Paley, William, Rev., devised the "watch found on beach" analogy for the Design Argument, 1802

Pangaea, first continent, split into current continents, 250M 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 in the universe. First proposed by Aristarchus c280 BC. Then 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. Advocated by, inter alia, Descartes and Spinoza.

Stoics: The whole universe is a manifestation of God. Schopenhauer: If God is the natural world, the word "God" is superfluous. 300 BC, 1576, 1670-1808, 2000

Panza, Sancho, servant of Don Quixote, 1605

Paracelsus, modernized medicine, 1527

Paradise, Muslim, 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 statement contrary to received opinion. 2. A statement seemingly self-contradictory or absurd, but in reality likely true, z.b., "Jefferson & Washington were traitors." Indeed they were, as they actively fought against the then established British government. But to Americans, they are heroes as the British established government was unjust and tyrannical. What they were depends on who writes the history books.

Parker, Theodore, Boston Anti-Slavery Society, government over all, by all, for all, 1854, 1863

Parmenides, Greek philosopher, There's only one eternal reality. c515 BC.
Particles. Matter is made of particles. Electrons are made up of three different types of quarks. Protons and neutrons are made up of smaller particles, the most fundamental of which are called quarks. Ultimately, “fields” are regarded as more fundamental than quarks.

Parzival, German epic poem, 13th century, 1200

Pascal, Blaise, Pensees / Thoughts 1670, “All the dignity of man consists in thought.” 1600, 1654-Air has mass, 1670-Bet God exists.

Pasteur, Louis, he did not originate the germ theory of medicine, but he did research it and in 1862 published research on it. Pasteurization, first for wine, then for milk. 1856-pasteurization, 1862-germ theory, 1884-rabies vaccine, 1973

Patrick, Saint, Ireland, a former slave, c450

Patriotism, veneration of one’s own country, used by the ruling class as a technique of social control; for Samuel Johnson, 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-Schoopenhauer, 1847-Wilde, 1916-Shaw, 1925-Mencken, 1933-fascism

Patterns of Culture, Ruth Benedict, significant 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 Books 1559 Paul 5, Pope, anti-Galileo, 1615-Bellarmino

Paul, Saint / Saul of Tarsus, Jewish rabbi most responsible for the initial growth and institutionalization of the Christian Church. He said that Jesus' resurrection proved Jesus is God, the Argument from Miracles. Purportedly wrote letters to various groups, some of which became parts of the New Testament. Some may have been modified by those who compiled the New Testament. Paul originated the concept of Original Sin, AD 45, 70-Heaven, 200-New Testament, 392, 413-Augustine, 500, 862, 1759 Voltaire, 1779-Hume, 1864-Bible, 1916-Shaw, 

Pax Ecclesiae, Urban 2, No fighting near churches 1096

Payne, Cecilia, the Sun is 90+% hydrogen 1925, 114

Peano, Guiseppe, symbolic logic c1912, 1931

Peano Revolt, England, Wat Tyler’s revolt, 1381

Peanists Revolt, Germany 1524-5, Luther, “Slay, crush the peasants.” 1524-5

Peebles, James, 1966, Big Bang model predicts the correct abundance of helium, Astronomy Timeline, p. 182+

Peirce, Charles, American, founded Pragmatism, 1890

Peloponnesian Wars, Athens and allies vs. Sparta and allies, 531-500 BC

Pensees/Thoughts, Pascal, Wager God exists. 1670

Percy, French epic poem 13th century, 1200

Pericles / Age of Pericles, funeral oration extolling democracy, 431 BC

Periodic Table of Elements, 1869, Dimitri Mendeleev, elements arranged by atomic weight, in 1914 it was corrected to arrange elements by atomic number, 1869, 1914, 1973


Peter Letters, Montesquieu, 1721

Peter Principle, Laurence Peters, in an organization, persons are promoted to their level of incompetence and remain there.

Phenomenon of Man, The, de Chardin. 1956

Phenomenology, a philosophy or method of inquiry premised on belief that reality consists of objects & events as they are understood in human consciousness. Or that division of any science that describes and classifies its phenomena.

Philosophe, French intellectual during the Enlightenment, anti-clerical, anti-king, 1624-deism, 1670, 1700-Enlightenment, 1725-Scottish Enlightenment, 1730, 1733-Voltaire, 1736-Frederick2, 1751-Encyclopedie, 1761-d’Holbach, 1776

Philosophie Naturel Principia Mathematica ("Principia") Newton, see Principia, 1687

Philosophie Zoologique, 1809, Lamarck, 114

Philosophy: traditionally is divided into 4 main branches, Metaphysics, Epistemology, Logic, and Ethics. Aesthetics is sometimes considered a fifth branch.

Some views regarding philosophy:

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 – is, in other words, the science of things in their first causes, in so far as these belong to the natural order.

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.

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.

Christopher Hitchens: 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.”

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.

C. G Jung: To ask the right question is already half the solution of a problem.

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.

Phoenician alphabet modified, it became the Greek alphabet, c750 BC

Philastrius, bishop of Brescia, compiled a catalog of heresies, wrong beliefs. 384

Photoelectric effect: When a light is shone onto the surface of a solid, electrons are released whose maximum velocity is independent of the intensity and increases linearly with the frequency of the light. For a given frequency, the number of electrons is directly proportional to the intensity. 1785-1840 Electromagnetism Timeline, p. 123, 1900, 1905-Einstein, 1913, 1919, 1927

Photon, a boson that carries the electromagnetic force, a quantum particle of light. It has no mass, it is pure energy, 1900-Planck, 1905-Einstein, 1924-de Broglie, 1952-Feynman

Physics, a set of the laws of the natural universe, its language is mathematics, the study of the motion and interactions of matter and the transformations between different forms of energy, the most basic science. Over 160 references herein

Piaget, Jean, educational psychologist & theorist, 1929 Piers Plowman, allegorical poem, 1376

Pinzon family of Palos, Spain, shipbuilders, sailors, contributed 1/3 of financing for Columbus, provided and captained two of Columbus’s three ships. 1492

Pitt, William, "Power is apt to corrupt." 1770

Pius 2, Pope Aeneas Sylvius, visited England before he became pope, saw 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, 1866, 1870, 1871, 1893

Planck, Max, light travels in discrete packets, quanta, 1900-quantum, 1905-Einstein, 1906-entropy, 1907-Einstein, 1927-relativity, 1973-Anthropic


Plantinga, Alvin Carl, 20th century American Christian theologian, 413, 1751-Hume, 1974-free will defense, 1982, 1993, Plate tectonics, drifting of continents, 1911, 1944


Platonic mathematics, Plato said that mathematics has an independent objective existence true whether anyone believes them or not. So math results are discovered, not created. (Paine’s view of all natural laws)

Playfair, John, geologist, 1802, 1820

Pliny the Elder, Natural History, AD 77

Plotinus, founded Neoplatonism, one of most important events in philosophy & history, AD 230

Plow / plough, most important farming invention, p.1, 9K BC, 3500 BC, 3200 BC-Egypt, 2600 BC-oxen, 1100 BC-iron blade, 250 BC-China, 100 BC-Celts, 879-moldboard, 910-wheels, 1519-America

Pluralism, 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 the most eminent and influential 20th century proponent of pluralism. 1963

Plurality of Worlds, Conversations Concerning the, Bernard Fontenelle, 1688

Plutarch, Greek philosopher, early cosmologist, 300 BC Problem of Evil

Plutus, comedy by Aristophanes, 425 BC

Proton, a positively charged particle forming part of an atom's nucleus. The number of protons in an atom determines what element it is and its atomic number. P.2, 1860-Avogadro, *Electromagnetism Timeline* p.136, 1936-money

Privation Argument, proposed answer to *Problem of Evil*, 413 Augustine, 1273-Aquinas

Probability, probability theory, the study of random or chance events, the mathematical theory of processes involving uncertainty (gambling problems were the impetus for the first studies regarding probability) Damon Runyon: The race is not to the swift, nor the battle to the strong [Ecclesiastes 9:1], but that's the way to bet it., 335 BC-induction, 150 BC-Carneades, 1654-Pascal, theory of, 1739-Hume, 1748-Hume on miracles, 1863-Mill, 1927-quantum theory, 1973-Dawkins argument, 1974-Plantinga, 1983-Hawking.

*Problem of Evil*, see *God, Arguments against*, this Index

Problems with belief in the existence of God, see *God, arguments against*, this Index

Problems of Philosophy, Bertrand Russell, 1912

*Process philosophy*/ Process Theology is 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. 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, 8000 BC

Property is theft, Pierre-Joseph Proudhon, French anarchist, shorthand for proposition that legal ownership without any of the responsibilities which went with it is a theft from those who actually worked the land.

*The Profits of Religion* Upton Sinclair, 1918

Progress, its Law & Cause, Herbert Spencer, 1857, 1861

Protagoras, Greek philosopher, Man is the measure of all things, 450 BC, 425 BC, 1687

Protestant Revolt, see Reformation

Protestantism: "The triumph of Paul over Peter. Fundamentalism is the triumph of Paul over Christ," Will and Ariel Durant, historians. Numerous mentions starting 1517

Proudhon, Pierre-Joseph, French labor leader and anarchist, 'Property is theft." 1840

Pseudo-Dionysius, God can't be comprehended, 300 BC, 500, c862-Eriugena, c1000, 1273 Aquinas

Psychology, c1000, 1651-Hobbes, 1750-Western love, 1930-Vygotsky

Ptah, Egyptian god who created the world, 3200 BC

Ptolemy I, Soter / Savior, Macedonian general under Alexander, then ruled Egypt, founded 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, 1464, 1543-Copernicus


Publius, Ovidus Naso / Ovid, Roman poet, AD 8

Pufendorf, Samuel, (1632-1694), German philosopher, Man has an innate spark of divine reason letting him understand nature's governing laws, including moral laws. Without moral laws, 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.

Purgatory, mythological place generally where moderate sinners go to wait out the penalties for their moderate sins before being admitted to Heaven (see also Limbo), 1095-indulgences, 1310-Dante, 1509-Erasmus, 1517-Luther

Pusey, Phillip, Dr., anti-Darwin, 1864

*Pyramid texts*, 2400 BC

Pyrrho, skeptic, nothing can really be known, 334 BC

Pythagoras, founder of school of Pythagoreans, Earth is a sphere; the universe follows natural laws; math is the key to understanding the universe; the Pythagorean Theorem is the most important theorem in mathematics. p.1, 620 BC-Greece, 540-BC mathematics, 387 BC-Plato, 1020-al-Haytham, 1267-Bacon, 1624-Bacon, 1687-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 algebra, Heisenberg, 1925

Quantum electrodynamics, Feynman et al, a relativistic quantum-mechanical gauge theory of photo-mediated electromagnetic interactions. 1952

Quantum fluctuations, could have caused large structures in space, Mukhanov, 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 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 in several different ways is the absolute square of a sum of complex contributions, one from each alternate way." Bohr and Heisenberg state that quantum mechanics is a complete theory in the sense that its basic hypotheses about the particle and wave parameters, and about uncertainty relations are ultimate final reflections of the real world and not capable of further modification, 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: Undoubtedly the greatest achievement in theoretical physics in the 20th century. p.1, 335 BC-Aristotle, 1273-Aquinas, 1900-Planck, 1905-Einstein, 1927-Bohr, 1939-
Red-shift: the optical phenomenon that the light from a star or a galaxy going away from Earth appears redder as the light waves are stretched out i.e., less waves per second, i.e., a lower frequency, as the red end of sunlight's spectrum is of a lower frequency than the blue end. Conversely light frequencies from a galaxy approaching Earth are bunched up and appear bluer, the blue-shift. Red-shift / blue-shift is the electromagnetic analogy to the Doppler effect for sound waves. 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 on causality. In a reductionist framework, the phenomena that can be explained completely in terms of relations between other more fundamental phenomena, are called epiphenomena. Often there is an implication that the epiphenomenon exerts no causal agency on the fundamental phenomena that explain it.

Religious reductionism generally attempts to explain religion by analyzing it to certain nonreligious causes. A few examples: religion can be reduced to humanity's conceptions of right and wrong, religion is fundamentally a primitive attempt to control our environments, religion is a way to explain the existence of a physical world, or religion confers an enhanced survivability for members of a group and so is reinforced by natural selection. Freud held that religion is nothing more than an illusion or even a mental illness. Marx claimed that religion is a drug that provides only "the illusory happiness of the people."

In science, reductionism implies that certain fields of study are based on areas that study smaller spatial scales or organizational units. For example, it is commonly accepted that the foundations of chemistry are based in physics, and molecular biology is rooted in chemistry.

In mathematics, reductionism can be interpreted as the philosophy that all mathematics can (or ought to) be built on a common foundation, which is usually axiomatic set theory.

The incompleteness theorems of Kurt Gödel, 1931, raised doubts about the attainability of an axiomatic foundation for all of mathematics. Gödel proved that for any self-consistent recursive axiomatic system powerful enough to describe the arithmetic of the natural numbers, there are true propositions known as formally undecidable propositions about the natural numbers that can't be proved from the axioms.

The contrast / compliment to the reductionist approach is holism, the idea that things can have properties as a whole that are not explainable from the sum of their parts. The principle of holism was summarized by Aristotle in the Metaphysics: "The whole is more than the sum of its parts".

In philosophy: The concept of downward causation poses an alternative to reductionism within philosophy. Some philosophers explore ways in which one can talk about phenomena at a
larger-scale level 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. In particular, they find that constraint is one way in which downward causation can operate. The notion of causality as constraint has also been explored as a way to shed light on scientific concepts such as self-organization, natural selection, adaptation, and control. Nobel laureate P. W. Anderson in his 1972 Science paper 'More is different' argued about the limitations of reductionism, namely the sciences can be arranged roughly in a linear hierarchy - particle physics, many body physics, chemistry, molecular biology, cellular biology, physiology, psychology, social sciences - in that the elementary entities of one science obey the laws of the science that precedes it in the hierarchy; yet this does not imply that one science is just an applied version of the science that precedes it. He writes that "At each stage, entirely new laws, concepts and generalizations are necessary, requiring inspiration and creativity to just as great a degree as in the previous one. Psychology is not applied biology nor is biology applied chemistry."

Reformation, The aka/religious The Protestant Revolt, the religious and political movement that started with Martin Luther in 1517 wherein various Christian clergy disagreed with certain Vatican dogma and got fed up with the corruption in the Rome centered Christian church. They were supported by civil authorities who wanted to avoid Papal taxes. The rebelling clergy generally wanted a religion more focused on their reading of the Bible without the intermediary of the Vatican. 1376, 1509-Erasmus, 1517-Luther, 1536-Calvin, 1545-Council of Trent, 1560-Knox, 1572-St Bartholomew's Day Massacre, 1659-Overview, 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, 1860 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 at c2/3 as fast as thru space / a vacuum.

Regula Monachorum, St. Benedict wrote rules for monastic life, 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, 1876 Reis, Piri, Ottoman map maker, 1513 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 increases, time slows down, mass increases, and lengths contract, p.1, 335 BC-Aristotle, 1632-Galileo, 1664-Descartes, 1826-Lobachevsky, 1886-Mach, 1905, 1907, 1915, 1918,1927,1962-Einstein, 1986, 1987-Hawking, 2012-Krauss Religion, an attitude of awe and reverence towards a god, or a supernatural entity accompanied by beliefs purportedly originating from the god. Alternatively, a belief system based on the presumed statements of an all-powerful entity. Richard Dawkins: "Many atheists believed that belief in a religion was harmless nonsense. 9-11 disposed of that."

Ritter, Johann, and Michelson, electrolysis, 1800
Robertson, Howard, red-shifts 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, Yale Law, politician, and TV professional Christian, said that God caused the Haiti earthquake of 2010 that killed 220,000 because Haitians had made a pact with the Devil to gain their freedom from the French in 1793. He also agreed with his theological colleague, Jerry Falwell, who blamed gays, lesbians, feminists, and the ACLU in part for Bin Laden's attack on the World Trade Center, 2001
de Robespierre, Maximillian Francois, leader of and then victim of the French Revolution, 1624-deism, 1789, 1793
Roemer, Ole, speed of light is finite, 1676
Roentgen, Wilhelm, X-rays, 1895
Romagnosi, Gian, first to say electricity and magnetism are related, 1802
Roman Catholic Church, largest Christian religion. It is the Western remnant of Christianity after early "heretical" Christian sects were expelled (Gnostics) or destroyed (the Cathars) & after Christianity split into Eastern Orthodox sects and Roman Christianity, and in the 16th century that portion of Roman Christianity left after Protestant Christian religions began to be founded.
Roman / Papal Inquisition, 1184, 1229, 1233-4, 1317, 1440, 1500, 1525m 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, Franklin Delano, US president, 1938
Roosevelt, Theodore, "No man is above the law." Richard Nixon, "When the President does it, that means it is not illegal."
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
Rougemont, Swiss theologian, anti-Darwinism, 1859
Rousseau, Jean, romantic, Discourse on the Sources of Inequality of Mankind, The Social Contract, 1586-social contract, 1624-deism, 1751-Enlightenment, 1754, 1758-contrary to Rousseau, 1762
Rowe, William, the evidential Problem of Evil, 1779
Royal Society of Edinburgh, formally founded in 1783
Royal Society of London for Improving Natural Knowledge, The, 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-Newton, 1768-Priestley, 1836-Darwin, 1860-Huxley, 1880-Hooker, 1880-Pearson
Rubin, Vera, astronomer, inferred dark matter from fast rotation of galaxies, 1970s, von Rumford, Count / Benjamin Thompson, analyzed ocean currents, 1803
Rushdie, Salman, ordered executed by Ayatollah Khomeini wherever he may be found, 1989
Rusticello, wrote up Marco Polo's adventures, 1292
Rutherford, Ernest; an atom has a tiny dense nucleus of protons with electrons orbiting around the nucleus. His and Bohr's models of the atom have been superceded by quantum mechanics. 1899-two kinds of radiation, 1911-model of an atom, 1913-Bohr changed the model, 1919-he made oxygen from nitrogen, 1932-Chadwick
S
Sabellians, early Christian sect, 321
Sacrament, religious rite that confers divine grace on the practitioner
Sagan, Carl, astronomer, atheist, estimated the universe contains 100 trillion trillion stars, 1973
Sagoyewatha / Red Jacket, Seneca Indian chief, p. 177
St. Bartholomew's Day Massacre, French child king Charles 9 ordered the mass killing of Protestants / Huguenots c1752, 1759-Voltaire, 1887-Acton
Saladin / Salah al-Din, captured Jerusalem, 1187
Salam, Abdus, physicist, 1968
Salvation, avoidance of being condemned to Hell
Sand, George, pen name of Amantine Lucile Aurore Dupin, Baroness Dudevant, mistress of Frederick Chopin, 1750, p. 179-The Index
Sanskrit, Indian Script, related to Greek, 400 BC
Sapir, Edward, The very structure of one's language influences how one thinks, 1938
Sargon 1, early Semitic king, his birth myth resembles that of Moses, c586 BC
Sartre, Jean Paul, existentialist, Man is condemned to be free, 1943, p. 179-The Index
Saul of Tarsus a/k/a Saint Paul. See Paul
Saving face, concept described by Henrik Ibsen, a lie one tells oneself to raise one's self-esteem. An extremely common phenomenon. 1881
Savonarola, Girolamo, ruled Florence, purist, bonfire of the vanities, c1494
Scaruffi, Piero, History of Knowledge, 1300-Renaissance Schilling, Pavel, Baron, telegraph, Timeline p. 123, 1846 von Schiller, Johann Christof Friedrich, with Herder and Goethe, sought to establish a new humanism by synthesizing Romantic, Enlightenment and classical ideas. Weimar Classicism, 1772, 1801
Schleiden, Matthias, Cell Theory, 1860
Schmidt, Maartin, measured spectra of galaxies, 1963
Scholastic School /Scholasticism, the theological and philosophical methods and systems of Mediaeval Europe which tried to reconcile Christian thought with the logic of Aristotle. 1000, 1076-Anselm, 1085-Adelard, 1150, 1209, 1273-Aquinas developed it, 1325-Battuta, 1397-humanists ridiculed it, 1500, 1509-Erasmus, 1515-ridiculed, 1517-criticized,
1589-Galileo ridiculed it, 1600 and 1620-Bacon criticized it, 1685-1752

Schopenhauer, Arthur, philosopher, The World and Will as Idea, “A certain amount of ignorance is the condition of all religions, the element in which alone they can exist.” 335 BC-laws of thought, 1880-Dostoyevsky

Schroedinger, Erwin, quantum mechanics, 1926-7

Schuman, Frederick L, International Politics; force, fraud, and favors, [He who understands the present knows the future.] 1532

Schwabe, Heinrich, sunspots have regular cycles 1843

Schwann, Theodor, cell theory 1860

Schwartzchild, Karl, revived idea of black holes 1916

Science: known as natural philosophy until 1840; 1. a method of discovering the laws of the universe. 2. The systematic study of the order in the natural world. Empirical science, an area of science dealing with the content of 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 anthropology, economics, psychology. Scientists start with the premise that the universe can be learned through reason and repeatable experiment, believers in the supernatural believe that knowledge comes from a supernatural entity. These are unreconcilable schools of thought. Science is distinguished from pseudo science by its economy, its measurability. Einstein, “The whole of science is nothing more than the refinement of everyday thinking.”

Science, Laws of / laws of nature / natural laws: dictate exactly 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. The laws of science together form a vast body of laws fitting onto a consistent set.

Science in Islam, the bridge between Greek thought and modern science. The productive years of science in Islam were from c800 to c1200.

Scientific Method, In the West, developed over the ages by numerous scientists / natural philosophers, the method of advancing knowledge. Not a fixed set of rules governing the conduct of scientists but a logical rational attitude toward scientific experiments. Herbert Feigl: 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 of a stupid

Tennessee law against teaching Darwinian evolution, 1925

Scott, Walter, Sir, first "nobles" were simply the most successful soldiers. He invented the historical novel. 550, 1805

Scottish Enlightenment, Unlike the French Enlightenment, it did not consider the church as its enemy. c1650-c1780

Scrub, Roger, philosophy seeks only truth, 1920

Second Continental Congress, named George Washington commander, adopted the Declaration of Independence. 1775-6

Second Ecumenical Council, 381

Segur, Monseigneur, anti-Darwin, 1859

Seleucus, heliocentrism, the Moon causes tides, c146 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." 1938

Seneca the Younger, Roman, comets follow natural laws, "What else is nature but God." "I do not obey God, I agree with him." AD 45, 1532, 1543

Senior, Nassau, economic advisor to Queen Victoria during the Irish potato famine of 1846-48. 1847

Serapis, Greek god of her Temple in Alexandria, 300 BC, AD 40

Serveto, Miguel (Eng. Michael Servetus), Spanish theologian, physician, circulation of blood, 1553

Sermon on the Mount, Important theology of Christianity. Matthew 5-7. AD 30, 45, 1963

Shaftesbury, Third Earl of, (1671-1713), a deist, the patron of Locke, an original and moral thinker of the Scottish Enlightenment. Helping others gave one enjoyment.

Shakespeare, William, dramatist, 1589, 1600, 1606

Shang Dynasty, mysticism, c1750 BC

Shannon, Claude, A Mathematical Theory of Communicating created Information Theory. The basic idea was that information could be broken down into quantifiable entities he called digital digits (now bits). Anything digital, thank Claude Shannon. 1948.

Shapely, Harlow, astronomer, advocate of the Steady State model of the universe, 1914, 1920, Astronomy Timeline p. 182+

Al Shatir / aka al-Din Abu'l Has San Ali ibn Ibrahim ibn al-Shatir, devised a non-Ptolemaic but still geocentric model of our solar system, c1340

Shaw, George Bernard, Irish, playwright, wit, Androcles and the Lion, Pygmalion, The Intelligent Woman's Guide to Socialism, "My way of joking is to tell the truth." "When a stupid man is doing something he is ashamed of, he always declares that it is his duty... The fact 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", 1300 BC, 1916

Shelley, Percy Bysshe, atheist, poet, 1811

Shen Kua, Chinese polymath, 1060

Shermer, Michael, skeptic, The Believing Brain, 1957

Shih Huang ti, emperor, united China, reformer, 240 BC
Singer, Peter, utilitarian philosopher, ethicist, “If one can do great good, one must.” 1979
Shinto, Japan, a form of national patriotism, a way of purification and communion with the deities and spirits of Japanese tradition, 500 BC, 604
Qutb al-Din al-Shirazi, the Sun may be center of orbiting planets, 1250, 1307
Shiva, Hindu god, the Destroyer, 2000 BC
Al-Shukra Ali Batlamyus, c1020, al-Haytham, doubted Ptolemy's universe but not geocentrism
Siemens: German electric company, 1860
Silk Road, name given in the 18th century to overland trails used for at least 1,000 years between the Mid-East and China, 1046 BC, 1292, 1437, 1452
Sinclair, Upton, incisive social critic, muckraker, wrote 100+ books from 1896-1976, most known for The Jungle, The Profits of Religion, A World to Win, Oil, and Boston, 1906, 1918
El-Sisi, president of Egypt, on the folly of Socialism, an economic and social system based on the communal ownership of the means of production and distribution, 1820s, 1835-Touqueville, 1881-Bakunin, 1934-Spengler
Smith, George, deduced that Greek and Sanscrit were related, translated Gilgamesh, 1872
Smith, Joseph, founded Mormonism, 1827, dictated Book of Mormon, polygamist, killed by a mob. 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, an imaginary theoretical and popular concept for the legitimacy of government during the Enlightenment. It asserts that people voluntarily enter into a contract with one another to have a government which would regulate their lives but provide for their common good. 1586-Bodin originated the concept, 1609-Althusius, 1651-Hobbes, 1670-Spinoza, 1689-Locke, 1754
&1762-Rousseau, 1586-Hume-the concept had no historical basis, 1833-Nietzsche, 1900-H G Wells ridiculed it. The closest instance of its actually ever been used is the 1620 Mayflower Compact (women couldn't vote.).
Social Darwinism, survival of the fittest soldier or businessman, justifies inequality, 1871, 1975
Socialism, an economic and social system based on the communal ownership of the means of production and distribution, 1820s, 1835-Touqueville, 1881-Bakunin, 1934-Spengler
Society of Friends (Quakers), founded c1647, repudiates violence & oath swearing, worship without ministers or liturgy. They teach an "Inner Light" of divine revelation. 1765, 1854.
Sociobiology, the biology of human behavior, popularized by Edward Wilson: Human behavior is the product of Man's evolutionary history, Sociobiology, the New Synthesis, 1975,
Sociology, the study of societies, 1830-Compte
Socrates, "follow the evidence," p.1, 1300 BC-golden rule, 530 BC Confucius, 450, 425 BC-ethics, 399
BC- trial for impiety, 387 BC-Plato continued his...
teaching, 335 BC-Aristotle, AD 30, 1273-Aquinas, 1763-Mendelssohn, 1875

Sol Invictus / Unconquered Sun, pagan Roman god.
One of the main theories regarding calling December 25th as Jesus' birthday is that Constantine made Sol Invictus's birthday December 25 as Jesus' birthday. (Another theory is that December 25 was picked as it was the popular Roman festival of Saturnalia. 321 Solon, Roman lawgiver, cancelled land debts, 150

Solvay Conference, Brussels, most eminent physicists met to discuss quantum theory. 1927

Solzhenitsyn, Alexander, The line dividing good and evil cuts through the heart of every human being. And who is willing to destroy a piece of his own heart? 1956

Sophism / Sophist, concerned only with the techniques of argument, even to use false arguments, 470 BC, 450 BC, 425 BC-Socrates, 387 BC-Plato

Sophocles, second great Greek tragedian, When gods do ill, why should we worship them? 470 BC, 1514

Sosigenes, in Alexandria, astronomer, 50 BC

de Soto, Hernando, Spanish explorer of South-Eastern North America, 1539


Space-time, a concept introduced by Einstein to indicate that Newton's separate concepts of space and time cannot be separate. Space-time is the only absolute quantity that belongs to events. 1905-Einstein, 1912-Russell, 1915-Einstein

Spanish Inquisition, 1184, 1478

Sixtus 4, pope, 1553

Speciation, separation of groups of organisms by their ability to interbreed. All cows and dogs can interbreed thus each is one species.

Spee, Frederick, Jesuit, criminologist, 1631, 1670

Spence, Thomas, Scottish land reformer, 1775

Spencer, Herbert, evolutionist, Progress, its Law and Cause, coined the phrase "survival of the fittest," and applied "progress" to Darwinism, 1857, 1859, 1861, 1864

Sprenger, Jacob, wrote a theological justification for torture in inquisitions, 1484

Spengler, Oswald, 1934

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.179-the Index

de Stael, Anne Louise Germaine, p. 179-the Index

Standard Model of particle physics, c1974-physicists agreed on the particles that are the fundamental particles that make up all matter. This standard model is meant to explain various physical phenomena. It is not an absolute as further advances in particle physics may find more particles. When consensus among physicists in 1974 (when the existence of quarks was confirmed), not all particles of the standard model (61 of them) had been found. Some were merely theorized based on what they should be like to fit into the standard model. As of 2014, all the particles are considered to have been found, the last being the so-called Higgs Boson, identified in 2013 at the Large Hadron Collider near Geneva. The Standard Model does not deal with dark matter, gravity, or dark energy.

Stanley, Arthur, Anglican Dean of Westminster. The Bible is twisted to make it sound reasonable, 1875

Stanton, Elizabeth Cady, suffragette, 1896

Starkey, Galileo, 1613

State sovereignty, Grotius. 1586 Bodin, 1609-Althusius, 1625-Grotius, 1750-balance of power

Statue of Liberty, "Give me your poor..." 1886

Steinbeck, John, writer, Grapes of Wrath, 1939

Stendhal / Marie-Henri Beyle, writer, realist, p. 3, p. 179


Steno, Nicolai, geologist, superposition, 1671

Stephen 3, Pope, used the forged Donation of Constantine to obtain the Papal States, 753

Sterne, Laurence, Brit. Tristram Shandy, p. 179

Stevin, Simon, hydrostatic Paradox, invented a sailing land yacht, introduced decimal fractions to the West, observed that large and small objects fell to Earth at the same rate, 1585, 1590

Stewart, Balfour, witness at Wilberforce-Huxley encounter re Darwinism, 1860

Stirner, Max, German, "God is dead." 1845, 1883-Nietzsche

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, 120-Epicetetus, 150-Marcion, 161-Marcus Aurelius, 413-free will, 529-Rome

Stress, the measure of the force acting on a body.

String theory from 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. Hawking and other astrophysicists say it is a good candidate for a theory of everything, 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 Vesalius, 1543

Sturgeon, William, electric motor, Timeline p. 123

Sublimation, change of a substance from a solid to a gas
Szilard, Leo, Hungarian-American physicist, chain reaction, atomic bomb, 1934

Tabitha, reputed died and resurrected, 1864
Tabula Rasa / blank slate, concept of the mind at birth, taught by Aristotle, Aquinas, and Locke, 1633, 1669-Locke, 1758-Helvetius, 1781-Kant, 1975
Tambora, Indonesia, volcano erupted. 1815
Tamerlane, Timur-u-Lang, Mongol chief, 1200
Taney, Roger, Supreme Court chief Justice, Dred Scott decision, slaves are property, 1857
Tansley, Arthur George, coined ecosystem 1935
Tanzimat, movement to reform and modernize Islam, principally in Turkey, 1839, 1862, 1886
Tao / the Way, Lao-Tsu, 350 BC
Taylor, Frank Bursley, plate tectonics, 1911
Taylor, Harriet, advocate for women's rights, wife of John Stuart Mill, 1859
Teleology, theory that purpose is the prime guide to movement in the universe; all things have a purpose, Greek telos = goal. Aristotle and others, basis of the Teleological / Design Argument
Telephone, 1860 Electromagnetism Timeline p. 135.
Tempter, Etienne, Bishop of Paris, Condemnations of 1270 and 1277 to halt the influence of rational thinking in Christian theology. 1270, 1277
Ten Commandments, Moses, c1300 BC
Tertullian, early Christian theologian, one need not think as God has done it for Man, 200, 405
Tesla, Nicola, physicist, showed alternating current better than Edison's direct current. 1860 Electromagnetism Timeline p. 135 (1883, 1890, 1895)
Tetrapod, animal with 4 legs, 2000
Tetzel, Johann, Commissioner of indulgences for Pope Leo 10, 1516-7
Thales, first eminent Greek natural philosopher, asked, "Is anything permanent?", Thales's Theorem right angles, 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 John Stuart Mill, 1874
Theism, belief in a God or gods
Theistic Evolution, or 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, Theodicies, Essay on, see Essais de theodicie. 1710
Theodicy, a justification for God's permitting evil and suffering in the world to overcome the Problem of Evil, 300 BC, 1710-Leibniz, 1751, 1779-Hume, 1788-
Kant, 1974-Plantinga, (1982 Mackie response to Plantinga), 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, 395
Theological-Political Treatise, Spinoza, 1670
Theology / theological, the attempt to organize the beliefs of a religion, or beliefs regarding a god, or studies regarding such beliefs. Christian theology attempts to reconcile the Bible with the real world
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
Thermochemistry, Henri Hess, 1840
Thermodynamics, science of heat. Thermodynamics concerns the interconversion of energy and work, laws of: 1. in a closed system, energy cannot be created or destroyed, only changed from one state to another. 2. Heat (a form of energy) can only pass from a warmer body to a colder body. 1687, 1785-1840 Timeline p. 123 (1842) 182- Carnot, 1840-Hess, 1842-Meyer, 1846-Thomson, 1847-Laws of, 1875-Gibbs, 1877-2nd Law of, 1906-3rd Law of.
Thermometer, 1000-Avicenna, 159- Galileo, 1687-measuring devices, 1717- Fahrenheit
Thesis, antithesis, synthesis, Hegel, 1820s
Thinking: thought
Cicero: To think is to live. Luther Burbank, "The greatest torture...for most people is to think."
Einstein: Connecting phenomena coherently.
Ralph Waldo Emerson: Beware when the great God lets loose a thinker on this planet.
James Thurber: Sixty minutes of thinking of any kind is bound to lead to confusion and unhappiness.
Eugene Ionesco: It isn't what people think that is important, but why they think what they think.
Henri Amiel: Action and faith enslave thought, both of them not to be inconvenienced or troubled or by reflection, criticism, and doubt
HG Bohn: Thinking is very far from knowing.
Buckminster Fuller: People should think things out fresh, and not just accept ... the conventional way of doing things.
William James, Reasoning is only one of a 1000 possibilities in the thinking of each of us.
Winston Churchill, referring to Anthony Eden, "Tony doesn't think, he associates."
Andrew Shtulman: 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 knowledge.).
William Shakespeare: There is nothing either good or bad but thinking makes it so.
Third Ecumenical Council, affirmed Mary's divinity 475 30 Years War, 1618-1648 Catholic vs. Protestant 1648
Thomas a Kempis, Imitation of Christ 1428
Thomas Aquinas / see Aquinas, Thomas, 1273
Thompson, Benjamin, see Count von Rumford, 1803
Thomson, Anderson 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, physicist, discovered electrons in 1897
Thomson, William / Lord Kelvin, physicist, 1802, 1846, 1848, 1852, 1865, 1892, 1897
Thought, basic laws of, Aristotle, 335 BC, 1160, 1748, 1751, 1819, 1905
Three Truths, Pierre Charron, critical of the Church, 1601
Thus Said Zarathustra, Nietzsche, 1883
Tindal, Matthew, Christianity as Old as Creation, 1730
de Tocqueville, Alexis, Democracy in America, 1831,
Tokogawa Shogunate, isolated Japan in 1628
Toleration, Essay Concerning, (except for Catholics and atheists) Locke, 1689
Toltsani, Giovanni, anti-heliocentrism 1546
Tolstoy, Leo, Count, patriotism is slavery. 1532
Tombaugh, Clyde, discovered Pluto 1930
Tommaso da Modena, Italian painter, 1350s
Torah, The, the law, Hebrew Bible, c586 BC, AD 30, 1765
Puritans, 1820s reform Judaism
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, inspired Columbus with tales of riches in the East,1492
Towneley, Richard, physicist, gasses 1666
Toynbee, Arnold, A Study of History, 410 Rome, 1377
Tragical History of Dr. Faustus, Thomas Carlyle, 1663
Transcendental, transcendentalism: relating to a spiritual realm, 550s-Christian Church, 862-
Neoplatonism, 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 Light, Huygens, 1690
Treatise on Man and the Formation of the Fetus, Descartes, 1664
Trevelyan, Sir Charles, British administrator of relief efforts for Ireland during the 1846-48 potato famine, said the famine was an "effective mechanism of reducing [Ireland's] surplus population." He was instrumental in minimizing any relief efforts. 1847
Treviranus, Gottfried, evolutionist 1802
Treatises on Civil Government, John Locke, life, liberty, and property, 1689
Trigonometry, mathematics of triangles, 2200 BC, 600 BC-Thales, 450 BC-Pythagoras, c1040-al-Jayyani -spherical trigonometry, 1202-Fibonacci, 1430-overview, 1466-Peuerbach, 1637-Descartes

Truth, John Dewey: What happens to an idea when it is verified by reality.

Tyranny of Words, Tyndale, William, translated Snow, 1959

Twain, Mark, riverboat talk for two fathoms, a safe depth for river boats, pen name of Samuel Clemens, writer, philosopher, riverboat pilot. "Faith is believing what you know ain't so. What is the chief end of man? –to get rich. In what way? –dishonestly if he can; honestly if he must. He said his mother told him that in her whole life she had never heard a sermon against slavery." AD 200, 1624-deism, 1830-The Book of Mormon, 1870, 1957, 2013, pp. 175 & 177

Two Cultures, The. Scientists & students of the humanities don't understand each other. C P Snow, 1959

Tyndale, William, translated Bible into English, so Henry 8 killed him, King James later used his translation, 1516, 1524-Bible, 1611-King James Version

The Tyranny of Words, 1933, Stuart Chase, 1950, semantics. Much of what we argue about is really not an argument about facts but one about definitions...If you let an enemy select the terms of the argument, he has already won it... Most political commentary is limited to 120 characters of shortened meaningless code words. 1938

U

Umar / Omar, Islam's second caliph/successor, 642

Unam Sanctum, Pope Boniface 8's Bull. Decreed that belief in the sovereignty of the pope over every human was necessary to be saved from the tortures of 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, etc it, Heisenberg, 1927

Underachiever Problem of the Design / Teleological Argument. 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, 1950

Uniformitarianism, geologic processes continue slowly, Lyell, 1830

Unitarian Universalist: religious philosophy that holds that all religions are true and all deserve respect. A Universe from Nothing, Why There is Something Rather Than Nothing, L. Krauss, 2012

Universe may be expanding, first suggested by Alexander Friedmann, 1922

Unknown Purpose Defense to Problem of Evil, akin to Skeptical Theology and a Leibniz theodicy. Man isn't knowledgeable enough to understand why God permits evil and suffering in the world, 1710

Urban 2, Pope, Pax Ecclesiae, don't make war near churches. 1096

Urban 6, one of two simultaneous popes, 1378

Urban 8, Pope, did in Galileo, 1492-slavery, 1610, 1624, 1633-Galileo

Ussher, James, God created the world 4004 BC, 1650

Usury, in Judaism & Christianity, charging interest for a loan was a sin. When this became inconvenient for wealthy Christians, usury's definition was changed just to charging high interest, 586 BC, 325, 1139, 1179, 1290-Usury bad, 1536-Calvin: Usury is OK

Uthman / Othman, third caliph, finalized Muhammad'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, 1863-John Stuart Mill, 1979-Peter Singer

Utopia, Thomas More, 1516

V

Valla, Lorenzo, confirmed Nicolas of Keus's proof that the Donation of Constantine was a forgery, 1440

Valtorta, Maria, religious Poem of the Man-God, p. 179 the Index

Van Til, Cornelius, founded a school of thought called Presuppositional apologetics. c1928

Vanini, Lucilio, Dialogues Concerning Nature, 1619, 1633-Galileo, 1719, p. 179 the Index

Vasa, Gustav, Swedish king, confiscated church lands, 1527

Vasari, painter of St. Barthemelow Massacre, 1572

Veblen, Thorstein, American economist, Theory of the Leisure Class, Conspicuous Consumption, "As a general rule, the classes that are low in economic efficiency, or in intelligence, or both, are particularly devout—as for instance, the Negro population in the South, much of the lower class foreign population, much of the rural population,..." 1776-Adam Smith, 1800-Social Critics-Hardy, 1899

Velenkin, Alexander, eternal multiverse hypothesis Velocity, in physics, speed in a certain direction. Venus of Laussel, small oldest known cave carving, depicts a woman, possibly a goddess, 20K BC

Vesalius, 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, 1855

da Vinci, Leonardo, Mona Lisa, 1506-Last Supper

Inventor, scientist, one of greatest intellects in history, "Experience never errs." Nature never
Watt, James, perfected Thomas Newcomen’s steam engine, 1765

Vindication of Natural Society, Edmund Burke, 1756
Vindication of the Rights of Women, Mary Wollstonecraft, 1793

Virchow, Rudolph, cellular pathology, 1858
Virgil, Roman epic poet, the Aeneid, 25 BC-Aeneid, 200-Bible, 1339-Plutarch

Virginia Declaration of Rights, George Mason, 1776, 1789-Bill of Rights

Vishnu, the Preserver, Hindu god, 2000 BC
Visigoths, barbarians, sacked Rome, 374, 410 de Vitoria, Francisco, 300 BC Problem of Evil, 1536-A Just war.

Volta, Alessandro, made first battery, 1799
Voyages of Discovery, c1450-1550
de Vries, Hugo, Intracellular Pangenesis, random mutations create new species, 1899
Vulgate Bible, St. Jerome, Official Roman Catholic Bible, in Latin, AD 405

Vygotsky, Lev, Russian psychologist, Man learns to think based on the concepts he knows; inner speech is different from one’s outer speech. 1930

W

Wahhabism, anti-female authoritarian Muslim sect, it controls Saudi Arabia, 1740
Wallace, Alfred Russel, evolution, 1850s independently developed the theory of natural selection but did not have the mass of evidence Darwin had. He became a champion of Darwinism. 1844, 1855, 1857, 1859, 1862, 1871
Wallis, John, conservation of momentum, 1670, 1687, Law of motion
van der Walls, Johannes, refined the PVT law of gasses, 1873
Wang Ch’ong, Chinese philosopher, AD 100

Warfare of Science With Theology in Christendom, Andrew Dickson White, 1896
al-Warraq, criticized the concept of God who orders his slave (Man) do impossible things and then punishes him for not doing it, c870

Washington, George, president, said to his troops in August 1776, “The fate of unborn millions will now depend, under God, on the courage and conduct of this army...We have therefore, to resolve to conquer or to die.” 1624-deism, 1755-Commander, 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, William, static electricity, 1747
Watt, James, perfected Thomas Newcomen’s 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, 350 BC
Weak force/beta decay / radioactivity, Marie Curie, 1896
Wealth of Nations, Inquiry into the Nature and Causes of, 1776-Adam Smith, 1867-Max, 1899-Veblen
Weber, Max, sociologist, economist, c1904
Webster, Daniel, Senator, 1830
Wegener, Alfred, plate tectonics, 1911, 1944
Weight: in physics, the amount of gravitational force exerted on a mass, thus varies from planet to planet for any given mass.

Weinberg, Steven, physicist, weak nuclear force and electromagnetic force are essentially identical, so there are only three basic forces 1968 “The more the universe seems comprehensible, the more it also seems pointless.” 1968, p. 187
Welton, James, basic laws of thought, 1905
Wesley, John and Charles, founded Methodism, 1750,
Weyl, Hermann, in 1923 published a book that noted the red-shift-distance correlation that in 1929 became known as Hubble’s Law, 1929

What is a Nation? Ernest Renan, 1882
Wheatstone, Charles, & William Cooke, built a telegraph before Morse, Electromagnetism Timeline p. 135
Whistler, James Abbott, painter, c1683
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, p.1, 1912-Symbolic logic
Whorf, Benjamin, (with Ed Sapir) semanticist, language influences thought, 1938

Why is there something rather than nothing? von Leibniz, 1714
Why torture for God? 1902, p. 180-H G Wells
Wilberforce, Samuel, Bishop, anti-Darwin, in Huxley’s “ape or bishop” encounter, 1860
Wilczek, Frank, astrophysicist, “Nothingness” is physically unstable, 2009

Wilde, Oscar Fingal O’Flahertie Wills, Irish wit, genius, “All great ideas are dangerous...If one tells the truth, one is sure, sooner or later, to be found out...A thing is not necessarily true because a man dies for it...Consistency is the last refuge of the unimaginative...There is no sin except stupidity...Conscience & cowardice are really the same things...Only the shallow know themselves,” 1847
Wilkins, Maurice, co-discovered DNA, 1953
William of Normandy, conquered English army at Hastings in 1066, took over England, 1066
William of Orange, assumed English throne in "Glorious Revolution" of 1688

Wilson, Robert, Bell Labs, found CMB, 1964

Wirtz, Carl, astronomer, in 1921 noted the red-shift-distance correlation that in 1929 became known as Hubble's Law, 1928


Wittgenstein, Ludwig, logical positivism, plain language philosophy, 1920s, Why should it be possible for believing anything if it isn't possible to be certain? A doubt that doubted everything would not be a doubt. 1922

Woehler, Frederick, synthesized urea, 1828

Wollstonecraft, Mary, powerful voice of feminism, died in childbirth at 39, *A Vindication of the Rights of Women*, 1793


Work, the amount of energy transferred to a system, or force times distance.

Wren, Christopher, astronomer, architect, 1684, 1687

Wright Brothers, Orville and Wilbur, developed first practical airplane by mastering the ailerons, the wing controls, essentially a motorized glider. 1903

Wright, Thomas, *The Milky Way* is shaped like a disc. He was the first to speculate that there were groups of stars beyond the Milky Way (before Kant), 1750

Wu-ti, Han emperor, Confucian, c136 BC

Wycliffe, John, priest, criticized the corruption in the Church, so the Church condemned him. 1300BC, 1376-Church corruption, 1389-Hus, 1398-Prague, 1414-his remains dug up and burnt, 1611-*King James Version*, 1693-Government, 1893-Huxley

Wylie, Phillip, American author, Ignorance is not bliss, it is oblivion, *Generation of Vipers*. 1943

Wilson, Robert, physicist, suggested use of the word language philosophy, 1920s, Why should it be possible for believing anything if it isn't possible to be certain? A doubt that doubted everything would not be a doubt. 1922

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Wylie, Phillip, American author, Ignorance is not bliss, it is oblivion, *Generation of Vipers*. 1943

X

X-Rays, an electromagnetic wave whose wavelength is 1000 times shorter than visible light waves. Discovered by Roentgen. 1895

Xenophanes, geologist, There's a great god over others, 540 BC-monotheism, 1000-geology, 1514

Y

Young, James and Robert May, mathematicians, developing 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, hated Blacks & Indians, "Slavery is divine." 1830, 1850

Young, Thomas, physicist, suggested use of the word energy to refer to a quantity of mass times velocity squared. He discovered interference in light, thus confirmed Huygens's 1687 theory that light travels as a wave, 1803

Ibn Yunus, Egyptian mathematician, astronomer, 1000

Z

Zachary, Pope, To say the Earth is a sphere is heresy and deserves excommunication, 750

Zantedeschi, Francesco, electric current 1829, 1785-1840 Electromagnetism Timeline, p.123

Zarathustra / Zoroaster, ethical dualism, c600? BC, 150 BC, AD 274, 1883

Zeno the Stoic, school of stoicism 300 BC

Zeroto: 4th law of thermodynamics. The shorthand rubric, "You could have a tie." Ralph Flower, two bodies in thermodynamic equilibrium with a 3rd body are in thermodynamic equilibrium with each other. 1935

Zeus, principal Greek god, (Roman Jupiter), c750 BC

Zheng He, (phonetic) Chinese general / admiral, controlled the Indian Ocean. 1405, 1433

Zola, Emile, "J'accuse." Exposed French anti-Semitism in the case of Captain Alfred Dreyfus, 1847

Zoser / Zoroaster, ethical dualism, c600? BC, 150 BC, AD 274, 1883

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Zola, Emile, "J'accuse." Exposed French anti-Semitism in the case of Captain Alfred Dreyfus, 1847

Zoser / Djoser, pharaoh, early pyramid, 2700 BC