

Ernie Stokely 9-25-2007



How did science and religion come to the current state of affairs where there are sharp disagreements about things like the teaching of evolution and the permission to do stem cell research? These pages are presented as a **very** brief overview of the history of science and religion. There are many links off of the SPAFER site that will take you to more detailed discussions of the brief summary presented here. This writing is

not

presented as being complete by any means, and by design selects those names and events that might best give a flavor to the complete historical story. Also, this writing chronicles the history of science and primarily Christianity. The stories of Judaism and Islam are not covered in detail except as they impact the science-Christianity story. These histories can be found on the Web using key words and a Google search. This presentation has been made to Sunday school classes at Vestavia Hills United Methodist Church and St. Luke's Episcopal Church in Birmingham, Alabama.

Imagine yourself sitting around a campfire 15-20,000 years ago somewhere in the area of Mesopotamia. Look to the sky ablaze with stars without light and air pollution. (Have you ever been out West on a cold winter's night away from light pollution and looked up? It is truly a wondrous sight not to be forgotten!)

The ancients were equally humbled by the night sky, by the rising and setting of the sun and moon, the change of the seasons, etc. The human mind wants to try and understand, to rationalize its surroundings. Thus, our species was led to postulate the presence of mystical beings, a god or gods who had powers beyond those of the human. There is no time here to talk about the evolution of our god concepts, but I heartily recommend to you Karen Armstrong's book, *The History of God*. God concepts have evolved over the millennia. According to Armstrong, very ancient humans that preceded the Hebrew tribes had a monotheistic God called the Sky God (monotheism is ancient), but this god was apparently so remote he/she was replaced by more accessible multiple gods, and polytheism became the norm. (One of the more popular was a female goddess called Great Mother. Sadly, the female component of our current God model was lost somewhere toward the end of the Middle Ages ... but that is another story!) Monotheistic god notions leading to our current monotheistic god of the Abrahamic religions re-emerged starting about 14,000 years ago. Read Armstrong's book to find out more about this interesting evolution.

Cosmology of the Bible – Science began as an observational (no experimental evidence) description of the observable cosmos, i.e., the sky and the earth. In the Bronze and Iron Ages the sky was thought to be a thin dome containing the stars. In the Old Testament, God was in the sky surrounded by angels and stars (I Kings 22:19; II Chronicles 18:18). The earth was flat as well and was the center of the known universe, with all stars and planets thought to be moving around the earth. The waters contained all kinds of mythical creatures (see passages in Psalms and elsewhere). Hell was below the earth somewhere, and is depicted differently in different beliefs and in different parts of the Bible. There is little in the New Testament to suggest what the writers believed about the cosmos of their times, but the scant evidence suggests that they either rejected or did not know about the Greek contributions to astronomy, and that they continued to believe the Old Testament stories about the universe. You can read more about Biblical cosmology in Wikipedia [here](#) or for more on cosmologies in other religions, see [here](#).



Modern Cosmology - Let's quickly jump to the present and take a very fast romp through some humbling facts from what we currently know about the universe that we can observe (much of our universe is not observable by us). If we take a string 10 feet long and let it represent the roughly 15 billion years since the "big bang," we see that about 2/3 way down the string (4.8 billion years ago) we have the creation of our galaxy and the coalescence of our planet Earth. Just a short billion years later we have evidence of the first simple single-cell life forms. These were probably archaeobacteria that developed around fumaroles in the deep

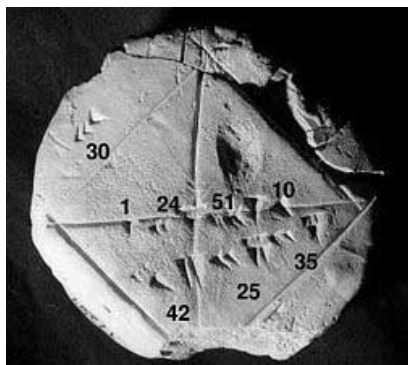
ocean. Life had evolved on earth! That is just eight inches down the 10' string from the formation of the earth. So, it took about a billion years of chemical experiments on the earth for life to evolve. It was just a wink in time ago, or only about 235 million years (less than two inches on the string from the present!) when the dinosaurs roamed the earth.

So, where is our species, homo sapiens, on this scale? How much distance on the string would we occupy? Well, if you take the time on the earth of our species to be about 50,000 years when our current species is thought to have become distinctly evolved from our nearest primate ancestor, we occupy a distance of 1/2 the width of a human hair on our 15 foot string!! We are indeed so very, very recent on the planet.

Our galaxy, the Milky Way, a modest galaxy as galaxies go, is over 100,000 light years across. That is the distance light would travel going at 186,000 miles per second in 100,000 years! In our galaxy there are estimated to be over 400 billion stars. Yet, there are 125 billion galaxies in the **observable** universe. This means there are over 5,000 billion billion estimated stars in the observable universe, more stars than there are grains of sand on all the beaches on the entire planet Earth!

Now let me give you some science factoids at the micro scale. Our spiral DNA molecule (see [here](#) for scientific details), composed of nucleic acid base pairs connected together in a spiral, is present in every cell and contains the code to make any cell in our body. Every living cell on the planet, be it bacteria, animal, or plant, has roughly the same kind of biochemical machinery in its cell(s). There are 3.2 billion base pairs in the human genome, yet there are over 4,000 known diseases that are caused by an error in a single base pair. The human genome contains 23 chromosomes and about 20,000-25,000 genes (each gene codes for one or more proteins), as do most mammals. Plants have 40,000-50,000 genes (more than us marvelous humans ... isn't that interesting?), mice also have about 20,000 genes; in the nematode (*C. elegans*) that feasts on the roots of my tomato plants each summer, the number is around 19 000; in a yeast cell (*S. cerevisiae*) that rises our bread there are approximately 6,000 genes; and the microbe responsible for tuberculosis has around 4,000. 97% of the human genome does not code for a protein and we are just now beginning the process of understanding the function of this part of the genome. Between humans, our DNA differs by only 0.2 per cent, or 1 in 500 base pairs. Finally, human DNA is 99.1 per cent identical to chimpanzees. Can there be much doubt about our evolution from the flora and fauna of the past?

The Ancient World



[Herodotus of Halicarnassus](#), [Democritus of Abdera](#), [Aristotle](#), [Archimedes](#), [Socrates](#), [Plato](#), [Ptolemy](#)

The Greek Era and the Beginning Disagreements between Science and Religion



The Greek Contribution - The Greeks indeed contributed much to modern science, and they kicked off the first recorded confrontations between the natural science of their time and Greek religion. Around 750 BCE the Greek story of creation came into being in the form of a number of gods that were a part of Greek mythology. Greek mythology makes for some very "R-rated" reading, and it is suggested that you read about the unabridged stories of the cavorting of the Greek gods late at night after the children are in bed!

The rise of modern science and mathematics in the "western world" was heralded by the development of the beginnings of mathematics around 600 BCE. In 335 BCE [Aristotle](#) was born. He,

[Archimedes](#)

,
[Socrates](#)

,
[Plato](#)

, and others laid the foundation of modern philosophy and contributed of the earliest writings on physics, metaphysics, poetry (including theater), logic, rhetoric, politics, government, ethics, biology and zoology. They also caused the first rift between religion and science by attacking mysticism and the religion of the times based on mythology. They called for thought based on reason rather than mysticism.

In the second century (150) CE, [Ptolemy](#) , a North African astronomer, created an astronomical canon that incorporated ideas of Aristotle (the orbits of the planets and the sun were thought to be circular and contained in concentric spheres around the earth). This planetary system orbiting the earth at its center was called the "geocentric" system and was the accepted system by the early Christian church as the one created by God. It was not questioned until centuries

later by Copernicus.

What's the Big Deal With Cosmology? - Why all this fuss about astronomy and cosmology? Well, religion (which preceded science) contained mythologies regarding the early understanding of astronomy, the stars, the planets, etc., and it contained stories about the creation of the universe. The priests, popes, and bishops who controlled the early (Christian) Church took these stories literally, since they were believed by most everyone. However, as more and more became known through scientific methods of astronomy and careful observation, the viewpoints of scientific cosmology and Biblical cosmology (and the official interpretations sanctioned by the Church) began to differ. Cosmology was the first arena of science for a disagreement with the Church. Others were to follow later.



The Rise of Christianity

Early Christianity has a rich history between 0 and 400 CE ("common era," or AD, or "after death"). It will not be covered in this short presentation, but more detail can be found [here](#). The great theologian,

[Augustine of Hippo](#)

(354-430 CE), authored a number of treatises that become the foundation of modern Christian theology. He was heavily influenced by

[Platonism](#)

(Plato: 427-347 BCE),

[NeoPlatonism](#)

, and

[Stoicism](#)

, and brought Greek influence into Christian theology at this point. However, he missed much of Greek natural philosophy (such as works by

[Aristotle](#)

) and insisted on basing Christian theology on faith rather than reason. The main cause of this omission was the few scholars in the Roman empire who could read and write Greek. Thus, so much of Greek science and philosophy was lost to Roman scholars for centuries to come.

The Decline - The "Dark" and Middle Ages



The Invasion - The Germanic tribes from northern and eastern Europe began to overrun the Roman Empire in around 400-500 CE. This started a decline in learning as people fled the cities and abandoned many of the developments of society that were in evidence during the height of the Roman Empire.

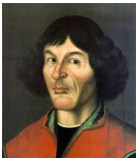
The Attempt to Preserve Learning - Between roughly 400 -1400 CE we have what are called the Middle Ages. During this time learning was kept alive in the Christian monasteries (abbots, priories, hermitages, etc.), but only the science that was written in Latin was preserved. Again, there were few that could read or write Greek.

Universities began to appear across Europe and Great Britain during this time (in Oxford, Bologna, Paris, e.g.).

The Great Islamic Handoff! - Although the Roman Empire was uneducated in the Greek language, not so with the Islamic world. Islamic scholars not only transcribed the Greek science into their own language, they carried forward the science and made their own contributions (see Teresi's book, *Lost Discoveries*, for more details or go [here](#) for more details). In fact, the period 700 - 1400 CE is known as the Islamic Golden Age. Beginning in about the 13th century or so, the science that had been nurtured by Islamic scientists began to make its way back into Western Europe ... across the Pyrenees from the Moors in Spain and from documentation from the Christian crusaders returning from the Middle East. The Renaissance was beginning to bloom in Europe as knowledge began to once again grow and new thinking began to flourish.

Unfortunately, Islamic science began a decline about that time - between the 10th and 13th centuries - due to several reasons, but primarily due to conservative and restrictive interpretations of the Qur'an and a turn from thought-based on reason to thought based on strict beliefs. That situation persists today in some sects of Islam.

The Rise of Science - The Enlightenment in Astronomy



The Trouble Begins with Copernicus - [Nicolaus Copernicus](#) was born in the Kingdom of Poland in 1473. His handbook, *On the Revolutions of the Celestial Spheres*, was revolutionary in its time. It was the first open suggestion in more "modern" times that the planets revolved around the sun, rather than the earth. This is known as a "[heliocentric](#)" system, rather than the "geocentric" system discussed earlier where the planets and the sun revolve around the earth.



Earlier traces of a heliocentric model are found in several anonymous Vedic Sanskrit texts composed in ancient India before the 7th century BCE. Additionally, the Indian astronomer and mathematician Aryabhata anticipated elements of Copernicus' work by over a thousand years. Aristarchus of Samos in the 3rd century BCE elaborated some theories of Heraclides Ponticus (the daily rotation of the Earth on its axis, the revolution of Venus and Mercury around the Sun) to propose what was the first scientific model of a heliocentric solar system: the Earth and all other planets revolving around the Sun, the Earth rotating around its axis daily, the Moon in turn revolving around the Earth once a month.

Copernicus circulated his theories mainly to his friends, and was too fearful of persecution by the church to publish his works widely. They did, however catch the eyes of Martin Luther, Johannes Kepler, Tyco Brahe, and Galileo Galilei.

The Rise of Science - The Enlightenment by Great Scientists and Philosophers

Johannes Kepler and Tyco Brahe- Two great astronomers lived during the 16th century. [Johannes Kepler](#) was a German astronomer born in Swabia in the south of Germany. [Tyco Brahe](#)

was a colorful Danish nobleman who lived in what is now called Sweden.

Tyco Brahe was once out drinking with friends as a 20-year old. He got into an argument and wound up getting his nose cut off in a duel. For the remainder of his life he wore a copper nose prosthesis. He is also reported to have had a pet moose which somehow drank too much beer during a party and fell down onto the floor and died. It is not known why he was in the house. Tyco Brahe was indeed a colorful fellow! He was also a very bright scholar and astronomer who was determined to provide a compromise between the heliocentric system proposed by Copernicus and the geocentric system maintained by the church. So, he advanced a theory that the sun and moon rotate around the earth, while the remainder of the planets rotate around the sun. The resulting system tied mathematicians and astronomers in knots for years until Brahe's theory was finally disproved. However, the Church was convinced that his speculations were correct, and they adopted his combination planetary system.

Meanwhile, Johannes Kepler tried in vain to convince Brahe that he was wrong, and that the Copernican heliocentric system was indeed correct. In fact, Kepler even figured out the elliptical orbits of the planets and laid the foundations for the careful observations later by Galileo. Remember, there were no telescopes yet in the 16th century.



Martin Luther - In 1483, [Martin Luther](#) was born. Luther, of course, was responsible for the Reformation. As we shall see later, it caused a splintering of the Roman Catholic church that was to indirectly widen the rift between science and religion. Luther also categorically rejected the Copernican system of planetary motion, and supported the geocentric system of the Roman Catholic Church.

The Rise of Science - Galileo, Newton, and Kant



Galileo Galilei - [Galileo Galilei](#) was born in 1564, and lived his life in the later throws of the Reformation. The bloody 30 Years War that racked Europe in the 17th century was fought during his later years. The Roman Church, in no mood for tolerating heretics, had instituted the first inquisitions in the 12th century. These continued through Galileo's time. Galileo, born in Roman Catholic Italy, could be said to be born at the wrong place and the wrong time in history.

Galileo did brilliant work in a number of fields of science including physics, mathematics, philosophy, and astronomy. It was his careful observations and keen thinking in astronomy, however, that got him into trouble. He built the first telescope (invented in Holland), and stubbornly believed that the church would accept his conclusions about the heliocentric nature of the solar system and his agreement with Copernicus' earlier speculations.

Alas, the church was in no mood at this point in history to tolerate the contradictory views of a lay person, not even the famous Galileo Galilei! He spent the last 10 years of his life under house arrest and narrowly escaped death and being condemned as a heretic of the Church. It took over 400 years for the Catholic Church to forgive Galileo. Only in October of 1992 did Pope John Paul II officially forgive Galileo and express regret for the way things had been handled in the mid-17th century. Wow.

Isaac Newton - On the year that Galileo died (1642), Isaac Newton was born in Protestant England into a lower income family. Newton was a very bright child, although as an adult he had a somewhat egotistical personality. After finishing his education he received a faculty post at Oxford. In 1664 he was sent home due to an outbreak of the plague in England. There he had time away from his professorial duties to study in his garden, observe the falling of the apple from the tree, ponder issues of gravity, mathematics, and write down his ideas. It was during this year most of his founding ideas in astronomy, physics, and mathematics were developed. His foundational document was *Mathematical Principles of Natural Philosophy* (in Latin), a pillar of science to follow. Would this have happened if Newton had not had his sabbatical away from the plague?

Newton was a Unitarian and he rejected Trinitarian theology. This became known at Oxford, and he was held back from advancement because of his religious views.

The Rise of Science - The Ages of Reason and Enlightenment



Immanuel Kant (1724-1804) – Born in East Prussia and a giant of philosophical thinking, [Immanuel Kant](#) defined " [enlightenment](#)

" toward the end of the 18th century, the late period of the Age of Enlightenment. He also ushered in the 19th century and its rich period of new ideas and discoveries. He wrote that one could not know if there was a God, but one could also not know there was not a God. He tried to reconcile faith and science basically by separating the two. Kant felt the focus should be on human relationships and not on the natural world, which he considered inscrutable.



The 19th Century - The Ferment of Ideas - Charles Darwin 1809-1882 No one in history more than [Charles Da](#)
[rwin](#) influenced

the rift between religion and science. The 5th of 6 children, he was born into a family of means. He was sent to Cambridge to study for the ministry after being a failure at studying for medicine. Charles' professor had been offered a globe-circling trip on the 100 foot boat, the *Beagle*

, but was unable to accept. He offered the trip to Charles. At first his family forbade him to go, but his uncle persuaded the family to support Charles in the voyage. He was seasick the entire five years of the trip. Charles's mother was a Wedgwood (of the famous pottery-making family), and Charles eventually married Emma Wedgwood, his 1st cousin.

Origin of the Species

was his blockbuster book, but

Descent of Man

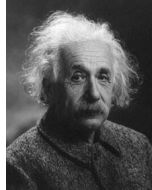
was his exposition on anthropology and the evolution of the human species. Darwin believed in God, and did not see a conflict between religion and his work, although he clearly understood the dissension between the Church and his work that followed.

The Philosophers and Theologians - Only a small sample of the ground-breaking and original thinking of the 19th century will be presented here. David Strauss (1808-1874) dared to suggest that the stories surrounding Jesus's life and work did not derive from actual events but had resulted from an Old Testament mythological tradition. Theology in the 19th century became diverse and sometimes contentious. For example, Charles Hodge (1797-1878), Professor of Theology at Princeton, wrote simply that Darwinism was atheism.

□ **Thomas Huxley** - [Thomas Huxley](#) (1825-1895) wrote treatises supporting the theory of evolution, even though he had doubts about Darwin's ideas of natural selection and gradualism. He enlarged evolutionary thinking to include ideas about human evolution and distinction between human races and genders. Huxley considered himself an agnostic. Almost totally self-schooled, Huxley made contributions not only in areas of thinking about evolution, he made large contributions to biology.

The 20th and 21st Centuries- Rise of Fundamentalism, Evangelicalism, and Progressiveism

Albert Einstein - Before moving to religious movements of the last century, no discussion of science



and religion would be complete without at least mentioning [Albert Einstein](#) (1879-1955). Einstein was born of Jewish parents, but was never a practicing Jew during his lifetime. Throughout his life Einstein believed in God, but not a god who intercedes into the daily physics of the universe. Einstein's great contribution was, of course, his ideas on relativity. These notions have had tremendous impact on the understanding of basic physics, and in fact upset many of the tenets set down by Newton. Einstein never liked quantum mechanics, yet his early work set the stage for the development of this branch of physics. At the quantum level strange random events occur, and "communication" takes place instantaneously across large distances. To the lay person, the quantum world remains shrouded in mystery. His work powerfully drove home the inadequacy of ancient religious understandings of science, and it forced religious believers to examine even more deeply their own god theology and their reconciliation between modern science and religion.

The Rise of Fundamentalism - In the 19th century there were two significant movements in Christianity that would be played out in the coming centuries - conservatism and liberalism. Liberalism in particular adopted many of the ideas from the philosophy of the times, and rejected the more orthodox teachings of Christianity. Finally, in the 20th century some Christians had had enough. They set out to formalize what it meant to be a Christian.

[Fundamentalism](#)

was born in the 1920s. Theologians at the conservative Princeton Theological Seminary played a role in this movement with their writings. In 1909, Lyman Steward, a businessman and Christian philanthropist, wrote a 12-volume series called

The Fundamentals

. This series of books became the foundation for the fundamentalist movement in the United States. Fundamentalists belong to all the major Christian denominations, and fundamentalism exists in all of the major religions today (especially troubling is the current Islamic fundamentalism and its beliefs regarding the lack of sanctity of human life). The fundamentalist belief often assumes the Bible is inerrant; hence, the fundamentalist cosmology follows that of the Iron and Bronze age understanding of the Bible. For example, fundamentalists may believe that the earth was formed as recently as 4,000 years ago. Evolution is rejected out of hand. The experimentation with stem cells is also another point of departure between many fundamentalists and scientists. There are many points of disagreement with scientific findings.

[Evangelicalism](#) is often confused with fundamentalism, although the two movements share some common characteristics. Evangelicalism is often characterized by Biblical inerrancy, and this causes conflicts between evangelicals and modern science.

[Progressive Christianity](#) is a relative new movement that can be considered to be a branch off of liberal Christianity of the 19th century. Progressive Christians have a metaphorical understanding of the Bible, and attempt to reconcile modern science with their Christian beliefs.

There are a number of late 20th century and early 21st century writers on the subject of religion and science, many of them having a negative view toward religion. These include Richard Dawkins, Steven Weinberg, Sam Harris, and many others. There are also progressive Christian writers, as well as many writers with a more fundamentalist viewpoint.

The Argument Over the Creation - Conservative and fundamentalist Christians reject the evolutionary and "big bang" stories of the history of the planet, and insist on adhering to the Biblical stories of the creation (there are two of them) in Genesis.

["Creationism"](#)

is a word that has been coined to describe the process whereby God created the universe in 7 days. Scientists were content to let religious believers have the right to believe in creationism until they began to intercede in the schools and change the way science was taught to children. Scientists became alarmed and felt that this jeopardized the scientific future and competitiveness of the U.S. in the world economy. Thus, there have been bitter, vocal outbreaks between the two camps over the creation story. "Intelligent design" is another way to suggest that God interceded into the evolutionary process by laying out the design of life found in nature. Scientists reject this theory as well, and consider it a threat to an enlightened, modern understanding of biology, cosmology, and the other natural sciences. This battle still rages in the United States.

Personal Theologies of God

People who come to SPAFER meetings have many understandings of God. Some are atheists and do not believe there is an entity such as God. Others are agnostics. What one comes to believe about God is a personal conclusion that results from a personal search. However, one's god theology has everything to do with one's ability to reconcile religion and science.



Only a very brief summary will be given here. Go to the links to read more about these theologies, many of which are very complex. Theologies that bear on the issue:

[Theism](#) – The ideas embedded in theism go back to the 16th century, but is still a primary God theology, especially in modern U.S. churches. In theism, God is an omnipotent entity that intercedes into the modern world (divine intervention), sometimes suspending the laws of nature by. A belief in a theistic god makes reconciliation with modern science very difficult.

[Deism](#) – Deists believe that God created the world and the natural laws, but does not interfere with the process in the present. Many scientists who still hold onto a belief in God have this model of God. It is compatible with modern science since there is no divine intervention.

[Atheism](#) – Many scientists, if not most, consider themselves to be atheists. There are more kinds of atheism than you might expect! See the link to the left to explore more. Atheism is compatible with modern science.

[Agnosticism](#) – Agnosticism is a belief that the existence of God cannot be proved, but the possibility for God to exist is left open. Many scientists share this belief. It is compatible with modern science.

[Pantheism](#) – Pantheists believe that God and the universe are synonymous, i.e., God is in and is everything. Pantheism is compatible with modern science.

Panentheism – [Panentheists](#) believe God is all that is in the universe, but is more, is the source of universal truth, and that God will likely always be beyond human understanding. Panentheism is compatible with modern science.

Process theology – [Process theology](#) plays a large role in the underpinnings of pantheism and especially panentheism. Process theology describes a God that is not omnipotent, and that God and everything in the universe is in change or "process". Self-determination plays a large role in

the world. God maintains a mysterious component, but moves the world toward “completion” or “good” in ways not understood. Process theology is compatible with modern science.

One's God theology is not the only key to one's view of modern science. The belief about the role of the Bible in one's religion also plays a key role. Two polar views are common today:

- a) The Bible is to be taken literally and is the infallible Word of God. This viewpoint makes reconciliation with modern science difficult since the entire Bible is written by men during the Bronze and Iron Ages when almost no modern science was known.
- b) The Bible is to be best understood metaphorically and understood in terms of the time when it was written. This viewpoint leaves room for building a compatibility between science and religion.