PART FIVE

ADVANCES IN CONTEMPORARY ISSUES OF SCIENCE AND TECHNOLOGY

BY

IKEDINACHI WOGU.

I. THE HISTORY AND ORIGIN OF MAN.

Science is a self-correcting process. To be accepted, new ideas must survive the most rigorous standards of evidence and scrutiny.

CARL SAGAN

I don't have the evidence to prove that God doesn't exist, but I so strongly suspect he doesn't that I don't want to waste my time.

ISAAC ASIMOV

Author of Isaac Asimov's Guide to the Bible

The deepest sin against the human mind is to believe things without evidence.

THOMAS HUXLEY

a. General Introduction to the Origin of Man

The Place where it all Began: Dr. Albert Chuchward, distinguished scholar, anthropologist, and archeologist theorizes that the earliest member of the human species appeared about two million years ago in the Great Lakes region of Central Africa. This early human species eventually spread over the entire continent. Many individuals in Dr. Chuchward's field generally agree with his theory, including Dr. L.S.B. Leakey. In 1963, Leakey found primitive human fossils, 1.2 million years old in East Africa.

Further discussion on this theory was published in Newsweek Magazine, January 11, 1988, in an article called "The Search for Adam & Eve." The subject was about the collection and testing of a global assortment of genes. A trail of DNA was found that led them to a single woman from whom we all descended. The evidence indicates that Eve lived in Sub-Saharan Africa, between 80,000 and 200,000 years ago. These descendants began migrating from their original homeland, inhabiting the whole world.

The African ancestry of the human race is now generally accepted as a fact. Dr. Eric Higgs, of Cambridge University has made a study of the migration of ancient men, and claims that the first man of Europe came to the continent from central and east Africa about 200,000 years ago. Professor Chester Chard, of the University of Wisconsin, has studied the routes of early men who left Africa to colonize the rest of the world, and he has concluded that there were four prehistoric migration routes from Africa to Europe.

Professor Leakey was asked if any of these early Africans reached the New World, and his answer was as follows: "It is inconceivable that man, the most curious and mobile of all animals, would not have come to America when the elephants, the tapirs and the deer came from Asia. Man spread out from Africa to Asia to Europe. It is inconceivable that he would stay out of America."

In 1988, the findings of anthropologists Christopher B. Stringer and Peter Andrews, of the British Museum of Natural History further confirmed the single-origin theory, that Homo Sapiens had evolved from an African Homo Erectus group, 200,000 years ago who had later migrated to Asia and Europe about 100,000 later. Both scientists contend that fossil evidence supports their single-origin theory. They also note that the oldest modern looking human fossils, from Western Europe, are only 35,000 years old.

Human skull remains, 2.4 million years old were found in Kenya in 1965. This new date places the origin of human beings within the period of major climate change, a global cooling is already believed to have caused other mammals to undergo dramatic evolutionary change. Geologist, John Martyn discovered the fossils while working in the Chemeron Beds in Kenya's Great Rift Valley. The date of the skulls was determined using a new scientific method called Agron.

These discoveries help to validate the fact that mankind originated in Africa. Humans born around the Great Lakes region, so very close to the equator, would have been very heavily pigmented. Gloger's Law states that warm-blooded animals born in such an equatorial region as the Great Lakes and Kenya will secrete
a dark pigment called eumelanin (melanin).

We shall in this section offer a critical analysis of contemporary information and arguments that has been presented for the history and origin of man, arguments and theories such as: arguments from the evolutionist perspective, arguments from the creationist perspective and other current arguments and theories that have been offered for the history and specific origin of man since antiquity.

b. The Prehistory of Evolutionary Theory.

I will not accept [creation] philosophically, because I do not want to believe in God. Therefore I choose to believe in that which I know is scientifically impossible - spontaneous generation arising to evolution.

- George Wald
1971 Nobel prize for biology

Acceptance without proof is the fundamental characteristic of Western religion.

- Gary Zukav

Belief in creation has been around for a long time, but not because it was the only alternative. Some of the first writings that conceive of evolution actually pre-date Darwin by 2,300 years. These writings were offered by Greek philosophers such as Lucretius, Anaximander, Thales, and Empedocles. But it was not until the nineteenth-century that a literally goddess explanation for the appearance of man became popular. Now atheism could finally say, "God doesn't exist because I don't need him to".

Since the time of Darwin's writings, advances in fields such as geology and microbiology, with the assistance of computer modeling, have led to new directions in evolutionary thinking. Darwin's original concept of evolution has since been superseded several times by ideas that better conform to evidence gathered since Darwin's time. Darwinism itself has been slightly changed and restated to account for what we call genes, and is now referred to as Neo-Darwinism.

One of the more recent evolutionary theories, Directed Panspermia, enjoys the prestige of having been formally introduced by one of the Nobel prize winning discoverers of DNA, Francis Crick. Crick's theory truthfully has one foot in the evolution camp and the other in intelligent design. I don't credit it toward the latter, however, for reasons that will be clear later.

Crick's work has since been slightly modified by Sir Fred Hoyle, British scholar knighted for his exemplary work in astronomy and astrophysics, and N. Chandra Wickramasinghe, noted Sri Lankan mathematician and astrophysicist. Their work has begun to take the non-Christian explanation for origins down a whole new path.

As for why these new paths are becoming popular, and why non-Christians as well as other anti-creationists are shelving Neo-Darwinism for other theories, the answer begins with looking at the traditional theory of evolution. First in terms of its history, then its explanation, and lastly the evidence for and against it.

Let us note that 'Evolution' was, and still is, a philosophy as much as an attempt at explaining human origins. And it is precisely because it is a closed and tightly embraced social philosophy that it can never become fluid and keep pace with advancing scientific discovery.

1. Darwin's Predecessors

In 1809, the evolutionary beliefs of Chevalier de Lamarck were published in Philosophie Zoologique. This French biologist believed that changes in, and adaptation to, environment shaped living creatures. These changes progressively accrued in their offspring until a descendant, many generations later, no longer bore any resemblance to its ancestors; even to the point of being a new species. (Note: while minor variations and adaptations within a species have always been accepted as fact (referred to as micro-evolution), the idea that the same process could affect changes on a macro-scale is what was; the new departure.)

Lamarck's idea described nature as a continuous escalator of being. At the low end, lifeless matter was turning into living cells, and all along the way creatures were on their way up.

Lamarck's concept of evolution as an inheritance of acquired characteristics would eventually prove false when genetics became known many years later. Genes fixed at conception were being passed on, not the habits and skills of the parent generation. But at the time, the philosophy of evolution caught fire as it perfectly dovetailed with the ideology of the Enlightenment and the French Revolution.

Socially interpreted, evolution was the concept that the lowly had the capability or even destiny to become great. Lower forms either became dominant or they perished. This was seen by some as an ultimatum and gave a seemingly biological and even moral justification for rebellion and overthrow of authority. This was
just one factor in the French Revolution, but not the last time evolution was to have such an effect.

In England at this time, Lamarck and his ideas were rejected for lack of proof as well as for fear of political instability. Still, evolution continued to be proselytized by such men as Robert Chambers and Herbert Spencer. It was Spencer who first coined the phrase "survival of the fittest". Spencer was a philosopher who applied the idea of evolution to social progress. He believed that,

Self-will and effort were the paths towards almost inevitable progress, and when applied to human society the survival of the fittest meant that advancement came from natural strength and the inherent capacity to adapt. Roughly speaking, the rich were rich because they had the prowess to become so; the poor were poor because they were lazy or incompetent, or both.  

Such ideas reflected many of the societal changes being brought about by industrialism in Victorian England. These changes included such things as cottage industries which incrementally grew into large and complicated factories; a very visual example of how the human species was being said to have evolved from simpler forms of life.

2. Darwin's Theory in Europe

The concept of evolution was quickly accepted as fact to non-theists and the politically ambitious, but to the rest of the world, and to those who were being subjugated in its name, evolution still lacked proof.

In 1859, a naturalist by the name of Charles Darwin established an intellectual basis for belief in evolution that was accepted by many as proof-enough. It was proof-enough for Karl Marx who felt that evolution validated his own views of society and materialistic philosophy. These he spelled out in Das Kapital.

If life was shaped by environment as evolution claimed, then so-called higher individuals had both the freedom and duty to shape society by political environment; this to their correspondingly higher likings. Marx was even moved to ask permission to mention Darwin on the dedication page of his book. However, Darwin's wife prevailed recommending against it.

In Germany, belief in evolution continued to spread quickly and with incredible zeal. Blackmore and Page note,

From the outset in Germany, Darwinism was adopted as an ideological tool which presaged a new future. As new animal species had risen from the graveyards of the old, so modern social reforms would eventually triumph over political conservatism. The thwarted revolutions of 1848 had created a pressure for liberal reform.

Zoologist Ernst Haeckel's belief in evolution added to that pressure:

Progress is a natural law that no human power, neither the weapons of tyrants nor the curses of priests, can ever succeed in suppressing... Standing still is in itself regression, and regression carries with it death."

Haeckel further stated in an unwitting prediction of Germany's then-near future,

The theory of selection teaches that in human life, as in all animal and plant life everywhere, and at all times, only a small and chosen minority can exist and flourish, while the enormous majority starve and perish miserably and more or less prematurely."

Others joined Haeckel in fueling resentment against authority; including the authority of the church as well as the state. Ludwig Buchner stressed the absence of God in his scientific writings Force and Matter. In his own writings, Friedrich Nietzsche declared, "God is dead! God remains dead!"

Near the turn of the century, and before his nation's central role in two world wars, Nietzsche predicted that 'the glorious demise of God' would sweep over Europe and that this would produce a new and wonderful Germany in the coming twentieth century. While all of this may or may not have been to Darwin's liking, Darwin nevertheless recorded, "The support which I receive from Germany is my chief ground for hoping that our views will ultimately prevail!"

Darwin had correctly judged the German peoples' acceptance of his ideas. Darwin's and Nietzsche's views prevailed in the mind of a then-unknown Bavarian house-painter named Adolf Hitler. Rightly deriving that morality stems from one's worldview, he would one day write, "Nature is cruel, therefore we have the right to be cruel".

To Hitler's (limited) defense, once the world began to embrace a purposeless, survival-of-the-fittest view of human origins, it was only a matter of time before someone conceived of a single master race of human species; one driven to dominate and out-survive all others. Unlike Darwin, however, Hitler would employ more than hope to see that those views prevailed.

3. Darwin's Theory in America

In America, as in England, religious conservatism slowed the acceptance of
evolution as a legitimate system of belief. However, evolution still managed to exert significant influence, notably in its legal system. For example, Christopher Langdell, dean of the Harvard Law School, theorized that as man evolved, then his laws must also evolve. Deciding that judges should guide the evolution of the Constitution, in the late 1800s he introduced the case law study method under which students would study judges' decisions rather than the Constitution. Blackstone's [Commentaries on the Law] was deemed to present an outdated approach to law because it taught that certain things were always wrong and did not change - particularly those related to human morality and behavior. [emphasis mine]

Incrementally, traditional interpretations of the Constitution were allowed to evolve just as humanity supposedly had evolved, in spite of the public's general rejection of Darwinism. Of the two most significant results, one was the movement of the legal system towards an amoral perspective. The foundation for judgments began to be moved away from the concept of right and wrong, and moved toward judges' personal interpretations and technical precedents. The role of judges reversed from one of being held in subject to the Constitution to one of controlling the Constitution:

Charles Evan Hughes, Chief Justice from 1930 to 1941 ...explained, 'The Constitution is what the judges say it is.'

The second major result was the beginning of a fragmentation of the judicial branch of government as set in motion by the legal system's adaptation of evolutionary principles. Although U.S. judges were originally conceived to collectively represent a single branch of government, the new emphasis on subjective and individual interpretation effectively released judges to become free agents; no longer having to act as if they played on the same team, no longer having to dispense the same so-called justice for all.

Because these effects of evolutionary theory are still in full force today, it is no surprise that judicial appointments have become hotbeds of controversy as we all wonder what new direction the law will take with each one.

A third result of evolutionary philosophy, not only in America but worldwide, was a so-called scientific basis for moral relativism. Speaking broadly of evolution's philosophical base, John G. West explains:

Scientific materialism was dubious science and even shakier philosophy, but it had far-reaching consequences for Western society. By claiming that all human thoughts and actions are dictated by either biology or environment, scientific materialists undermined traditional theories of human freedom and responsibility. By asserting that our moral beliefs were merely the products of heredity or environment, scientific materialists laid the groundwork for moral relativism. [emphasis mine]

If that is not sufficiently clear, Ludwig Buchner provides an application:

Man is no more 'responsible' for becoming willful and committing a crime than the flower for becoming red and fragrant. In both instances the end products are predetermined by the nature of protoplasm and the chance of circumstances.

Once again, if life is a purposeless accident, then both purpose and the adherence to or deviation from that purpose (right and wrong) are illusory, or are subjective social constructs at best.

4. Darwin's Theory in Religion

Finally, no review of evolutionary beliefs and evolution-based relativism would be complete without mentioning the philosophical contributions of Julian Huxley. More than avid on Darwinian evolution, Huxley created what he himself called a religion around the belief in evolution. That religion is called humanism. In Huxley's own words,

This new idea-system, whose birth we of the mid-twentieth century are witnessing, I shall simply call 'humanism'. It must be focused on man... It must be organized round the facts and ideas of evolution...It will have nothing to do with Absolutes, including absolute truth, absolute morality, absolute perfection and absolute authority.

Huxley had rightly observed that evolution discards the concept of moral rights and wrongs in its description of humanity to be an accidental by-product of biological mistakes rather than a purposed creation by an absolute authority. Yet one must seriously question whether right and wrong were not discarded first and it was evolution that was the resulting effect as Huxley explains:

I suppose that the reason that we all leapt at the Origin [of Species] was that the idea of God interfered with our sexual mores.

Aldous Huxley, Julian's brother and author of Brave New World, said nearly the same thing:

We objected to the morality [of creationism] because it interfered with our sexual freedom.
Aldous further stated that evolutionary philosophy was essentially just a tool for liberation from moral rights and wrongs.  

The admissions by Julian and Aldous Huxley that belief in evolution is more the result of a justification for sexual promiscuity than it is the result of evidence are alluded to by many modern day anti-creationists. Fred Hoyle, though one of Darwinian evolution's harshest critics, bluntly states that belief in evolution is "psychological rather than scientific" and reveals that, "the biggest thing going for Darwinism was that it finally broke the tyranny in which Christianity held the minds of men for so many centuries."  

Hoyle's writings themselves disdain biblical morality, as do certain science-oriented works by Francis Crick, Carl Sagan, and other secular evolutionists. These jabs seem out of place in science books until one remembers that a prejudice against biblical morality or other forms of absolute authority are sometimes the premise of evolutionary conclusions, and are thus a very necessary part of the complete evolutionary argument.  

Of the three formal arguments for evolution, the first theory we will review is Neo-Darwinian evolution, the form of evolution most widely known. It is the foundation upon which all subsequent evolutionary variations have been built.  

The second evolutionary argument, punctuated equilibria, proposes a time line radically accelerated beyond what Darwin visualized for the development of life.  

The third argument, directed panspermia, accepts the accelerated time line, but proposes a radically unusual location and process for the origin of life.  

Then we will introduce intelligent design theory, and then, lastly, creation science.  

c. Darwin's Theory  

*The deepest sin against the human mind is to believe things without evidence.*  

THOMAS HUXLEY  

*It is sure mankind is older than a half million years but no fortunate accident of discovery has yet given us evidence to prove it.*  

ROBERT BRAIDWOOD  

1. How Darwin arrived at his theory  

FROM MID 1800'S TO MID 1900'S: On December 27, 1831, Captain Robert FitzRoy set sail in the H.M.S. Beagle to chart parts of South America and a number of islands in the Pacific. Charles Darwin filled his request for a naturalist to accompany him. Over the five year voyage, Darwin collected rocks and creatures from almost everywhere they sailed and recorded over 2,100 pages of notes. It was not during that trip that his belief in evolution coalesced, but about ten years after his return.  

Though Edward Blyth had written papers in 1835 and 1837 stating much of that which only Darwin is known for today, Darwin set forth his beliefs in 1859 in a book called *Origin of Species* which carried the subtitle Preservation of Favoured Races in the Struggle for Life. Blackmore and Page summarize the basis of Darwin's beliefs to be:  

- The abundance of animal types and the gradations between them,  
- The unique adjustment or adaptation of each to its environment, and  
- The changing nature of the environment in which they live.  

Darwin recorded in his autobiography:  

I happened to read for amusement 'Malthus on Population', and being well prepared to appreciate the struggle for existence which everywhere goes on from long-continued observation of the habits of animals and plants, it at once struck me that under these circumstances favourable variations would tend to be preserved and unfavorable ones destroyed. The result of this would be the formation of a new species.  

In explaining his theory, Darwin did not address how life initially began. Though he closed *Origin of Species* with an acknowledgment of a god who may have initially set everything in motion, he never really specifies exactly what he believes god is or what god did. A reference to deity, however bland, was probably to minimize the controversy he anticipated his theory would create.  

Darwin had written in a personal letter that announcing his theory was like confessing a murder. But the step of completely eliminating deity, which Darwin held back on, his proponents around the globe were quick to take; especially during the era in which scientists believed they had disproved God.  

Within a short time after the introduction of *Origin of Species*, evolution was synonymous with atheism. Evolution being an outgrowth of a materialist view of science, its embrace by materialists was quite predictable. Since the discovery of DNA, Darwinism has been enhanced by its modern proponents to account for genetics and in this state is referred to as neo-Darwinism. Here is a simplified explanation of life as we know it according to Neo-Darwinian evolution:
2. Darwinism as modernized per DNA studies.

A random chemical combination in a liquid pool of organic building blocks early in earth's history happened to produce a chemical structure capable of reproducing itself. As generations of these structures reproduce, slight mistakes in copying are made. These mistakes are called mutations.

In what is called natural selection, environmental changes play a key role by eliminating the mutations of life forms less fit to survive than others. The mutations which do survive result in those forms out-surviving and, consequently, outnumbering the previous form.

This new and likely more complex form would dominate until it, too, made a beneficial reproduction mistake that resulted in a yet more survivable form, and so on. Life according to neo-Darwinism is then the ongoing result of reproductions being eliminated by or adapting to environmental changes (natural selection), and a half billion years of beneficial genetic mistakes; copy errors to be precise.

Neo-Darwinism is summarized as holding the following beliefs to be true:

1. Life must form by accident. (Because natural selection has to do with competition of survival and reproduction among living systems, there is no evolving per se of non-life to life.)
2. Mutations can add to and improve the condition of any life form.
3. All complex life forms must coalesce by "numerous, successive, slight modifications."
4. Like an inverted pyramid, a survey of the different animal life forms should be narrow at the base (if life began from a single cell) and broaden over time as more and more creatures reproduced.
5. New groupings of animals should be evidenced to be, or at least to have been, continually emerging from on-going evolution throughout time.
6. Millions or billions of years of slight mutations should leave a generally even trail of transitional life forms and intermediate species between the single cell and the complex forms in existence today.

3. Problems with Neo-Darwinian Evolution

1) Life cannot form by accident. This will be addressed in detail here, but for now know that a living cell was thought of in Darwin's time as the most basic unit of life. A century before genetics and electron microscopes, it was probably not a big leap for materialist atheists to believe life's origin was just a lucky combination of chemicals.

2) Mutations subtract from, not add to, a cell's genetic code. Again, DNA, RNA, nucleotide bases and such were all unknown to Darwin. In the latter half of the twentieth century, neo-Darwinists substituted genes for Darwin's 'inherited characteristics' to explain the passing down of traits. Yet we now know that mutations, even favorable ones, remove information from a creature's genetic code. So while it might be rendered 'more fit' for at least one generation, it would necessarily be less complex, not more.

Not only is a less complex reproduction contrary to what neo-Darwinism predicts, mutations are always less likely to be able to reproduce. Thus the greater the mutation, the less likely it is to be the ancestor of anything. Hoyle and Wickramasinghe point out why mutations are far more likely to be detrimental, not beneficial:

But without any concession to logic, the argument can be stated inversely. If the standard of one's competitor's decline, one can afford to decline oneself and still survive... Thus by assuming implicitly that the competition does not decline, the Darwinian theory really begs the question... We saw above that the variations on which natural selection operates arise from the miscopying of genetic messages. Mis-copying commonly loses information and gains it only rarely. The variations on which natural selection operates are therefore strongly biased towards decline.

On a more fundamental level, at any given time natural selection assumes that a group of living systems already exists so that only the more survivable variations within it win out over the weaker. In other words, natural selection as it is observed only explains how variations within a species increase or recede. It cannot explain how the species or even life itself came to exist in the first place.

3) Life forms do exist which cannot have coalesced by slight modifications.

Darwin at least recognized this possibility and warned in his Origin of Species that:

If it could be demonstrated that any complex organ existed which could not possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down.

Such things have been demonstrated by Michael Behe and Michael Denton; forms described to be irreducibly complex. Examples of these include bacterial flagellum, the immune system, blood clotting, and perhaps even the eye. Dr. Behe explains

But what type of biological system could not be formed by "numerous, successive, slight modifications"? A system that is irreducibly complex.
Irreducible complexity is just a fancy phrase I use to mean a system that is composed of several interacting parts, where the removal of any one of the parts causes the system to cease functioning. The common example of irreducible complexity is that of a wooden mouse trap. You don't start with just the platform and catch a few mice, then add a holding bar and catch a few more, then the spring, later the hammer, etc. All parts must be in place in order for the trap to trap. This contradicts neo-Darwinism because the evolutionary theory describes a cumulative process whereby fitness improvements are added bit by bit over generations. Therefore, because the individual parts of irreducibly complex systems don't contribute to survival until they are all in place, unintelligent natural selection cannot be used to explain them.

A further possibility concerning irreducible complexity is emerging over DNA. In the movie "Jurassic Park", DNA was removed from ostrich eggs and replaced with dinosaur DNA. Jonathan Wells reports that DNA replacement has been tried (not with dinosaurs). But what happens is that the egg continues its original development until it dies for lack of the proper nutrients.

In other words, DNA replacement not only fails to change the species of an embryo, it fails to successfully control its development. Thus a possibly irreducibly complex system may be that of DNA working in combination with membrane patterns and the cytoskeleton, and or additional organs within living creatures.

4) The appearance of animal types do not follow an inverted pyramid. They instead all appear at the approximate same time in the early geologic time known as the Cambrian period. This has been termed the Cambrian explosion which is explained to have occurred suddenly - in a geologic eye blink. It was never to be repeated. From these Cambrian animals issued nearly all the major animal groups...that ever existed on earth...Thirty seven of those [original fifty or so] body plans have survived to this day. They have been elaborated with additional features but never basically altered. 76

Thus the evidence shows that virtually all complex life forms show up suddenly in the Cambrian period with no transitional lineage preceding them in the Precambrian. This is not compatible with neo-Darwinism or any natural selection-based evolution.

5) Animal species are not ever-widening. To the contrary, they are in decline. Referring again to the Cambrian explosion, this is sometimes called biology's "big bang". The fossil record shows all the basic animal types (phyla) showing up together suddenly, after which no new types ever were added. This archaeological fact is consistent with creationist or intelligent design predictions, but not with neo-Darwinism.

Various environmental and naturalist groups are rather vocal today about protecting species of animals from extinction. To their credit, they in effect realize that life on this planet is not the ever-widening pyramid base as postulated by neo-Darwinism. Because cross-species mating is not possible, when a species is critically low on members it is in serious trouble. Where advocacy groups err is in claiming recent industrialization is the chief foe. Industry may contribute to the situation, but fossil records indicate the decline in species began in the periods following ancient Cambrian times.

6) There are absolutely no cross-species transitional life forms, as Darwin admitted. This is the evidence Darwin most ardently hoped for - the discovery within the fossil record of a very gradual chain of life forms. Though freely admitting his own lack of evidence at the time, Darwin likened the fossil record to trying to read a book that had most of its pages torn out. What the fossil record did show was the abrupt appearance of many different life forms, and some of those very complex. Evolutionist Michael Denton writes:

Again, the first representatives of each major group appear in the fossil record already highly specialized and highly characteristic of the group to which they belong... The virtual complete absence of intermediate and ancestral forms from the fossil record is today recognized widely by many paleontologists as one of its most striking characteristics.

With no proof of his theory to be found in the fossil record, Darwin was unable to answer why life fails to appear as gradually as his theory necessitates. Darwin himself said:

To the question why we do not find records of these vast primordial periods, I can give no satisfactory answer... The case at present must remain inexplicable, and may be truly urged as a valid argument about the views here entertained.

A personal letter Darwin wrote confirms his lack of evidence in trying to prove one species can become another:

But I believe in nat. selection, not because I can prove in any single case that it has changed one species into another, but because it groups and explains well (as it seems to me) a host of facts in classification.

Evolutionist George G. Simpson pondered in his work Tempo and Mode in Evolution:
This regular absence of transitional forms is not confined to mammals, but is an almost universal phenomenon, as has long been noted by paleontologists. It is true of almost all orders of all classes of animals, and it is apparently also true of the analogous categories of plants. 

After more than a century of scholars searching for bona fide transitional forms as proof of Darwin's theory, Hoyle points out that "there are now so many workers in the field that nothing clear-cut can have been missed" and suggests that Darwin's concept of evolution is unquestionably wrong as indicated by the "persistent and increasing difficulty of the silence of the fossil record". Fellow evolutionist and Harvard Professor Stephen Jay Gould also confirm the absence of transitional forms:

The absence of fossil evidence for intermediary stages between major transitions in organic design, indeed our inability, even in our imagination, to construct functional intermediates in many cases, has been a persistent and nagging problem for gradualistic accounts of evolution. This unpublicized absence of evidence for Darwinian evolution Gould has even chided to be "the trade secret of paleontology". Although the discovery of evidence for Darwinian evolution has evaded everyone from Darwin on down, the fruitless quest for transitional forms has nevertheless produced interesting stirs of excitement. That shall start the next segment.

d. Finally, The Missing Links!

Science is a self-correcting process. To be accepted, new ideas must survive the most rigorous standards of evidence and scrutiny.

CARL SAGAN

1. The search for transitional forms

Archaeopteryx was once thought to be the first find of an actual transitional form. It was a fossil impression of a feather dated prior to the believed appearance of birds. The name was coined by Hermann von Meyer, but it was a collector by the name of Haberlein who acquired the entire fossil. Haberlein's asking price for it was supposedly so high that the curator of the Munich fossil collection resorted to publishing a personal sketch of it. Haberlein's potential fortune was thwarted until, amazingly, he just happened to turn up another Archaeopteryx. This one he succeeded in selling for 20,000 German marks.

Although Archaeopteryx had been marketed as being the missing link between dinosaurs and birds, close study revealed that it failed to show any true intermediary signs. The creature had both fully developed reptilian legs as well as fully developed bird feathers - no half-scale, half-feather type developments. Blackmore and Page records:

In 1985, Fred Hoyle and Chandra Wickramasinghe claimed the fossil was a blatant forgery. Haberlein, they said, had assembled some dinosaur bones and added feather marks by pressing real feathers on to a paste of powdered limestone. Fragments of chicken feathers in the pasting were said to have been detected using a microscope. Some evolutionists continue to believe Archaeopteryx to be genuine; declaring it proof that birds descended from dinosaurs. At the same time, other evolutionists are as convinced the complete opposite is true; that dinosaurs descended from birds:

The dinosaurs that came before Archaeopteryx were all much less birdlike than the ones that came after. If the BADD (birds are dinosaur descendants) theory were correct, we would see plenty of very birdlike dinosaurs - Velociraptors and such - in the fossil record earlier than Archaeopteryx. Where are they?

In the end, there is no consensus among evolutionists of what, if anything, Archaeopteryx is clear proof. With the significant doubt over this supposed transitional form, the search for the first genuine proof of Darwinian evolution still goes on. The most zealous search was, and still is, for the missing link between modern man and the previous form or forms from which he supposedly came. During the hundred plus years of searching, six instances of discovery are of particular importance to mention.

2. Finally, the missing links!

The most zealous search in evolutionary archaeology was, and still is, for the missing link between modern man and the form, or forms, from which he supposedly came. During the one hundred plus years of active searching, these six high-profile discoveries are among evolutionists' greatest finds.

1. Neanderthal Man was the earliest pronouncement of having linked ape and man. In 1856, an unusual skeleton was found in a cave in the Neanderthal Valley near Dusseldorf, Germany. The posture indicated the creature may have walked
with an ape-like gate. Eight years later, scientists began to wonder if this was an ancestral species of mankind. The discovery of other skeletons in the same cave produced ancestors that were clearly human.

Further investigation revealed that the occupant of the initial skeleton had suffered from a vitamin D deficiency, like rickets. Even Thomas Huxley was confident that the skeleton was definitely not the missing link. The classification of Neanderthal Man was consequently changed to Homo sapien. The find had created such a stir in its day however, that the term "Neanderthal" remains descriptive of a backwards or crude person, not someone suffering from a crippling disease.

2. Java Man, or Pithecanthropus erectus, was the next missing link claim to stir investigation. In 1887, Eugene Dubois set out for Sumatra in order to find humanity's missing link. Easily enough he found it, or so he thought. In 1891, Eugene Dubois had found three teeth and, one hundred yards away, a small piece of a skullcap. One year later he found a fragment of a left thigh bone. They were all found in a river bed among the bones of various extinct animals.

The excitement of the discovery drew twenty-four European scientists to confer on the matter. However, the majority opinion was that the elements had all come from an ape. Seven dissenting scientists believed they had all come from a man. Professor Virchow of Berlin made the comment: "There is no evidence at all that these bones were parts of the same creature". [141]

Later, Dubois produced two human skulls he had found at the same level as the skullcap and stated his new belief that the fragments had all come from a gibbon.

Nevertheless, there remained the feeling that science had just missed discovering the missing link. Java Man came to be the placecard for the missing link that evolutionists hoped to someday find. So confident were many in its expected discovery that Java Man still remains in many textbooks. Donald Johanson, discoverer of Lucy, even appears to attribute man's first use of hand axes to imaginary "Java Man". [142]

3. Piltdown Man followed as the next discovery to vie for the title of missing link. In 1912, Charles Dawson presented to the British Museum a partial skull, bone fragments and teeth he found along with some primitive tools. They had been found in a gravel pit in Piltdown, Sussex, England and were estimated to be 500,000 years old. The missing link was finally found. Then came a discovery in October of 1956. Scott Huse writes:

Reader's Digest came out with an article, summarized from Popular Science Monthly, entitled The Great Piltdown Hoax. Using a new method to date bones based upon fluoride absorption, the Piltdown bones were found to be fraudulent. Further critical investigation revealed that the jaw-bone actually belonged to an ape that had died only 50 years previously. The teeth were filed down, and both teeth and bones were discolored with bichromate of potash to conceal their true identity.[143]

It was later testified to that philosophy writer Teilhard de Chardin had placed them there in order to expedite the proof of evolutionary theory. Photos of the teeth show they had been filed down in such an unrealistic manner (each at different heights and angles) that there is no way natural wear would have produced such a result. The skull had belonged to a human, the jaw to an orangutan.

Of further note about Piltdown Man is that during the fifty or so years it was believed authentic, evolutionists wrote and taught of the apelike features of the skull (which proved to be human) and the humanlike features of the jaw (which proved to be orangutan). These falsehoods have had little or no negative impact on the believability of Darwinism and, incredulously, still serve to support it to some degree.

4. Nebraska Man was the 1922 entry for proof of man's evolution from ape. Nebraska Man was also the clinching evidence presented in the famous Scopes monkey trial of 1925. John Scopes was accused of teaching evolution in violation of the state law of Tennessee. Scopes was defended by Clarence Darrow and W.R. Malone who cleverly argued the legitimacy of teaching evolution in spite of the technical illegality of their client's actions with respect to then current law. The prosecuting attorney, William Jennings Bryan, tried to counter this strategy by saying that:

It is not scientific truth to which Christians object, for true science is classified knowledge and nothing can be scientific unless it is true. Evolution, on the other hand, is not truth; it is merely hypothesis - it is millions of guesses strung together.[144]

Darrow responded by presenting a discovery that Harold Cook had found in the Pleocene deposits of Nebraska: a single tooth. With the use of so-called expert testimony, the tooth was introduced as confirming proof that an ape-man race once inhabited the prosecutor's own home state one million years ago.

The prosecution asked for more time to investigate the tooth, but Bryan lost the case. Tragically, he died five days later. It is especially tragic in light of the fact that subsequent investigation unearthed the skeleton from which the tooth came. The
tooth was decided to have come from an extinct species of pig. The decision to allow the teaching of evolution as science, though based on errant data, was never reversed.

5. Ramapithecus was another supposed ape-man based on several teeth and part of an upper jaw. Over forty skeletons from which these came have been found. These have come to be classified as orangutan-like and not at all on the way to becoming human.

6. Australopithecines, or Lucy, was found in 1974 by Donald Johanson in Ethiopia. Lucy is a three and a half foot skeleton about forty percent complete. However, the knee joint was found over a mile away and two hundred feet deeper than the rest of the skeleton. It is that same knee joint, along with a thigh bone, on which Johanson stakes his claim that the chimpanzee-like creature walked upright three million years ago. In spite of the fact that the knee joint end of the femur was crushed, he states:

The angle of the thigh bone and the flattened surface at its knee joint end... proved she walked on two legs.

The assertion here is that walking upright, if that can actually be granted, is proof that humanity evolved from this creature. Yet, it has been observed that the rain forest pigmy chimp spends most of its life walking upright. Therefore, the ability of chimpanzees to sometimes walk upright is insufficient proof of our supposed evolution from them. One of Johanson’s fellow evolutionists, anthropologist Richard Leaky, dismisses Lucy’s authenticity and actually believes it to be a mosaic of two or more species.

3. Tools of chimps or men?

As recently as May of 2002, CBSnews.com reported a story about living West African chimpanzees who have been discovered using crude stone tools to break open panda tree nuts. The chimps retain the same specially selected stones at common “workstations” where the young, apparently for untold ages, have learned to reproduce the procedure by watching their parents.

Expectedly, the evolutionists interviewed were thrilled at the idea they were watching exactly how early man worked. Their attitude was basically, “We know that early man, too, worked that way because those are the same kinds of tools we have found and are displaying in our museums.” Of course, the most obvious possibility was not even mentioned in the article - the possibility that the rocks or “stone tools” in our museums might never have belonged to early man at all. Two things to come to mind:

1. The stones may have actually belonged to chimps, not ancient man; and not millions of years ago, maybe just thousands of years ago. Or even just last week (why not?). And...

2. If a chimp can make use of an ancient rock to feed himself today, isn’t modern man capable of doing the same? Yes. Thus the crudeness of an alleged “stone tool” is not necessarily indicative of how long ago it must have been used. Neither does its age or condition prove who must have used it, or what their cranial capacity was.

In this article, researchers from the Max Planck Institute for Evolutionary Anthropology did show just a little humility in admitting that all the implications of this discovery were not yet clear. What is clear is that there are always two sides to the story behind every evolutionary find, and that dedicated evolutionists have proven not to be the most objective source from which to hear them both. The next three examples reinforce this point.

4. The Evolution of The Horse

A popular example of evolution in many text books is that of the horse. The Field Museum of Chicago was the source of this exhibit, showing a range of skeletons progressing from a rodent-sized creature to that of today’s full grown horse. However, Gene Edward Veith shares the little-publicized truth that the skeletons:

...have nothing to do with each other. They represent different species, different branches, and overlapping times, as even evolutionists - called on the matter by critics of Darwinism - have been forced to admit. The Field Museum, to its credit, has pulled the showcase, substituting a photo of the old exhibit, along with an account of the controversy. "Once we told the story wrong," it confesses, making "the complex seem simple."

5. The Evolution of the Finch

The National Academy of Science’s publication Guidebook cites what casual readers might mistake to be a valid example of natural selection. The example concerns beaks of finches found on the Galapagos islands. The work Guidebook cites is by Peter and Rosemary Grant of Princeton University (though they omit the title of the Grant’s research paper). Part of the text follows:

...a single year of drought on the islands can drive evolutionary changes in the finches. Drought diminishes supplies of easily cracked nuts but
permits the survival of plants that produce larger, tougher nuts. Drought thus favors birds with strong, wide beaks that can break these tougher seeds, producing populations of birds with these traits. The Grants have estimated that if droughts occur about once every 10 years on the islands, a new species of finch might arise in only about 200 years.\[116\]

Phillip Johnson fills in some critical details that Guidebook omits:

It is no wonder that the Guidebook's authors did not quote the title of the Grant's 1987 paper in Nature, "Oscillating Selection in Darwin's Finches," because that would have signaled to teachers, and perhaps also to bright students, that the finch-beak example involves no continuing directional change at all. The drought year in question was followed by a few years of floods, and the average beak size promptly went back to normal.\[116\]

Contrary to how natural selection is claimed to progress a species, the adaptation by progressive generations of finches during drought years did not replace the original species pattern. The original pattern was restored upon normal environmental conditions. Evolution cannot explain this backwards adaptation, but normal variation and known adaptive abilities within a species can. It is regrettable that the National Academy of Sciences apparently knows this and, for that reason, had to present the craftily edited tale of natural selection that they did.

6. The evolution of the moth

One more classic example of natural selection at work is, or was, that of the peppered moths of England. The 1999 July/August edition of Touchstone magazine sets up the story:

According to the textbook story, the moths rest during the day on tree trunks and are eaten there by birds. While the tree trunks were light-colored, the light moths were better camouflaged, but the dark moths had the advantage after the trunks became dark due to the effects of industrial pollution.\[116\]

The story concludes with the light moth population coming back after air quality was improved in the 1950's. Furthermore, a 1980's discovery found that those moths did not even rest on trees, and previous photos of moths on trees were of moths (dead or alive) hand-placed or glued into position.

If you find any of the above evolutionary falsehoods shocking, you probably want to ask, "What do more honest evolutionists have to say about all this? Haven't they spoken out?"

e. Evolutionists on Neo-Darwinism

Evolution is a theory universally accepted, not because it can be proved by logical, coherent evidence to be true, but because the only alternative, special creation, is clearly incredible.

D. S. WATSON

I will not accept [creation] philosophically, because I do not want to believe in God. Therefore I choose to believe in that which I know is scientifically impossible - spontaneous generation arising to evolution.

GEORGE WALD

1971 Nobel prize for biology

1. Modern evolutionists on Darwinian evolution

What probably seems most strange about all of these failed missing links and exposed hoaxes is that most, if not all of them, remain stated as evolutionary facts in many modern textbooks and films. Sir Fred Hoyle expresses his personal frustration about so many of his anti-creationist colleagues who remain silent on the known impossibility of Darwinian evolution:

...there are so many flaws in Darwinism that one can wonder why it swept so completely through the scientific world, and why it is still endemic today.\[40\]

Hoyle reveals that the answer to his question is just as shockingly unscientific as he believes Darwinism to be:

This situation is well-known to geneticists and yet nobody seems prepared to blow the whistle decisively on the theory. If Darwinism were not considered socially desirable, and even essential to the peace of mind of the body politic, it would of course be otherwise.\[40\]

Though the errors of Darwin's theory are not politically correct to speak of, one hundred and fifty years of failure to find any of those missing links has taken a serious toll on the evolutionary community. Paul Lemienne, President of the Geological Society of France and Director of the Natural History Museum in Paris, said this of Darwin's beliefs:

The theory of evolution is impossible. At base, in spite of appearances, no one any longer believes in it... Evolution is a kind of dogma which the priests no longer believe, but which they maintain for their people.\[40\]
Chandra Wickramasinghe made a similar comparison in speaking of adherents of Darwinian evolution:

I think they turned a blind eye to anything that doesn’t tie up with their (essentially) theology. There’s no evidence for any of the basic tenets of Darwinian evolution. I don’t believe that there ever was any evidence for it. It was a social force that took over the world in 1860, and I think it has been a disaster for science ever since. [44]

The chief paleontologist of the British Museum of Natural History, Colin Patterson, deserted his own personal belief in evolution. In April of 1979, he was asked why he did not include a picture of any one of the seven million fossils at the museum as representing a transitional form or missing link. He responded, “If I knew of any, fossil or living, I certainly would have included them”. [45]

By 1981, Patterson regarded Darwinian evolution as "telling stories". The British Museum then drew criticism as many of its displays were appended with the preface, "If the theory of evolution is true...". Nature magazine ran an article over this entitled Darwin’s Death in South Kensington. The article described the museum’s public display of doubt in evolution as "shot through with heresy". [46]

Dr. Etheridge of the British Museum of Science further noted that "Nine tenths of the theory of evolution is sheer nonsense...This museum is full of proofs of the utter falsity of [evolutionists'] views”.

Ambrose Fleming, president of the Philosophical Society of Great Britain said that "The evolution theory is purely the product of the imagination".

Canada’s Dr. W.R. Thompson of the Commonwealth Institute for Biological Control is also considered to have sinned against Darwin when he associated the acceptance of evolution with a breakdown in scientific integrity. Hoyle agrees that such a breakdown has taken place as he has personally observed:

We have received hints and even warnings from our friends and colleagues that our views on these matters are generally repugnant to the scientific world. We in our turn have been disturbed to discover how little attention is generally paid to fact and how much to myths and prejudice. [47]

Another anti-creationist who has assaulted classic Darwinian evolution is Harvard professor Stephen Jay Gould. Gould, along with Niles Eldredge of the American Museum of Natural History, is not among those who have timidly remaining silent on Darwinism. Gould reportedly announced to a conference at the Field Museum in Chicago,

It has long been a trade secret of paleontologists that transitional forms do not exist; that missing links do not exist either. [48]

It is on the absence of transitional forms that Gould and Eldredge developed the next major contribution to the theory of evolution: punctuated equilibria.

### f. Punctuated Equilibria

Well, evolution is a theory. It is also a fact...And humans evolved from ape-like ancestors whether they did so by Darwin’s mechanism or by some other yet to be discovered.

STEPhEN JAY. GOULD

Science is a self-correcting process. To be accepted, new ideas must survive the most rigorous standards of evidence and scrutiny.

CARL SAGAN

1. Evolution Theory #2: Punctuated Equilibria

The scientific community’s formal rejection of Darwinism’s slow, gradual evolution of one species into another probably began in the 1930’s with Richard Goldschmidt. While acknowledging the modifications caused by micro-evolution within a given species (something that was never challenged), he expressed doubt that slow evolutionary changes over great periods of time resulted in new species.

Goldschmidt considered examples such as a creature evolving from a crawling species into a flying one. At some point, Darwinian evolution maintains that creature would have appendages that were half feathered wings and half scale-covered legs. Accordingly, this would leave countless middle generations to be rather poor at either running or flying. This would be a significant threat to another Darwinian necessity: survivability. Less obvious transitions would present equally difficult problems:

The lungs of reptiles consist of millions of tiny air sacs; whereas, bird’s lungs have tubes. The piecemeal evolution of bird’s lungs from reptile’s lungs seems virtually impossible. [49]

Goldschmidt’s theory was that massive changes came about suddenly in single generations. This theory additionally required that an appreciable number of like-mutations must have appeared during the same generation. Simultaneous like mutations are essential. Otherwise, when one-of-a-kind creatures mated with their normal species, if even possible, the mutation would disappear. The mutation would be lost; if not immediately, then after a sufficient amount of interbreeding with normal genes. Hopeful monsters, as they were dubbed, must
have similar monster mates in order to propagate their mutation.

2. As Modernized Per DNA Studies

Today's modernized hypothesis of Goldschmidt's theory contemplates non-functional DNA, called pseudogenes, mutating for generations unnoticed. Then, when a more rare functional gene mutates, the functional gene triggers the other mutations. At this point, the traditional analogy of Goldschmidt's hopeful monster theory might occur: a lizard's egg hatches and a bird flies out.

Stephen J. Gould and Niles Eldredge likely found the hopeful monster theory too incredulous, but confirmed that the fossil record was absent of transitional forms. What the fossil record did show, they said, was that many creatures, like the marine bivalve, existed for tens of millions of years completely unchanged. Then, when the geologic record appears to indicate their sudden disappearance, a different, fully developed form abruptly appears; again, with no indication of transitional development.

By 1977, Gould and Eldredge incorporated these observations into an evolutionary theory, or modification, called **punctuated equilibria**. This would describe **macro-evolution as a rare and relatively quick event**. Transitions happen:

- just fast enough as to avoid leaving evidence in the fossil record (or leaving enough to be found),
- just slow enough that it cannot be observed, and
- just rarely enough that no species-to-species transition has ever been or will likely ever be observed or discovered.

3. Problems with punctuated equilibria:

a. not simple

b. no (primordial) soup for you

1.) Punctuated equilibria differs from Darwinian evolution in the amount of time and degree of change thought to occur between each favorable mutation. However, punctuated equilibria, like traditional evolutionary belief, theorizes there once existed a primordial soup of the building blocks of organic matter from which emerged a simple living cell.

Although information about a primordial soup and the nature of cellular life was insufficient in Darwin's day to weigh in on the issue, a great deal of information has been gained in these areas in the last thirty years. What this information shows is that:

a) **cellular life is not simple**, and
b) there was no primordial soup.

DNA co-discoverer Francis Crick's research shows that the early earth did not have an oxygen-poor atmosphere amenable to such a soup:

Since the atmosphere interacts with the chemicals on the surface of the earth, the chemical composition of the earliest sedimentary rocks should give us some clues to the composition of the early atmosphere. ...if all the available rocks of a given age are considered, then, when averaged, the evidence suggests that the atmosphere in the past was rather like what it is today. [86]

Wickramasinghe declares that his own work with Hoyle confirms Crick's investigation into the early earth's atmosphere:

This had been around for a good many years, the general belief, that life has to originate on the surface of our planet from some kind of primordial soup which developed in the very early days of the earth's history... The atmosphere of the earth was supposed to be of a character that permitted the formation of complex organic materials, according to the conventional story, and our investigations revealed to us that earth's atmosphere could not have had this character. [81]

Drs. Thaxton, Bradley and Olsen concur argued further:

Furthermore, no geological evidence indicates an organic soup, even a small organic pond, ever existed on this planet. It is becoming increasingly clear that however life began on earth, the usually conceived notion that life emerged from an oceanic soup of organic chemicals is a most implausible hypothesis. We may therefore with fairness call this scenario 'the myth of the prebiotic soup'. [82]

2.) Even granting the existence of a primordial soup which punctuated equilibria demands, microbiology has only recently revealed the true complexity of so-called simple cells. Michael Behe points out that these inner workings of cells were totally unknown in Darwin's day; workings which early evolutionists had a largely simplistic and erroneous conception. Molecular biologist Michael Denton expounds on the actual workings of the cell:

What we would then see would be an object of unparalleled complexity and adaptive design. On the surface of the cell we would see millions of openings, like the port holes of a vast space ship, opening and closing to allow a continual stream of materials to flow in and out. If we were to enter one of these openings we would find ourselves in a world of supreme technology and bewildering complexity...

...Is it really credible that random processes could have constructed a reality, the smallest element of which -- a functional protein or gene -- is complex beyond our own creative capacities, a reality which is the very antithesis of chance, which
excels in every sense anything produced by the intelligence of man? Hoyle positively agrees with Behe and Denton stating, Biochemical systems are exceedingly complex, so much so that the chance of their being formed through random shufflings of simple organic molecules is exceedingly minute, to a point indeed where it is insensibly different from zero. Fellow evolutionist and molecular biologist Hubert Yockey also agrees:

The origin of life by chance in a primeval soup is impossible in probability... A practical person must conclude that life didn't happen by chance.

These evolutionists, regardless of their unique differences, are absolutely clear and unanimous on this point: Life was no accident.

3.) Even if simple cells, as complex as they really are, can be granted to have miraculously appeared out of impossible primordial pools, the fossil record remains the star witness against both Darwinian evolution and punctuated equilibria. The fossil record displays that highly complex living systems existed from the very beginning. Hoyle writes:

If one believes that life originated on Earth, the compulsion to search for an ancestral cell is strong, and the tendency is to imagine that there must have been a time when simple cells existed, but when complex cells did not... this belief has turned out to be wrong.

Hoyle further records:

Most of the biochemical complexity of life was present already at the time the oldest surface rocks of the Earth were formed. Thus we have no clue, even from evidence which penetrates very far back in time, as to how the information standard of life was set up in the first place, and so the evolutionary theory lacks a proper foundation.

This being the case, Gould’s theory, like its predecessor, has no scientific foundation by which to believe that life forms have chronologically progressed from one species to another.

4.) Punctuated equilibria, like modern Darwinism, assumes the layering of fossilized life forms in the theoretical geologic column to be representative of serial development; a progression from the small and simple to the larger and complex. However, as pointed out previously, this is not conclusive of serial
development. The layering seen in the column is not substantially different from what any cross-section of the earth reveals right now.

In the deepest levels of the sea and earth, tiny microbial life can be found. As one moves toward the surface levels, creatures are progressively found larger in size and complexity. If a large asteroid hit the ocean, or a large volcano exploded and raining silt and debris covered all land-born life in place right now, imagine what a future generation of evolutionists might conclude. By digging into a cross-section of the resulting geologic column, they would find the remains of people, then below that gophers, then grubs, then mites, then single-celled creatures, and mistakenly conclude this was a serial development. Each form must have preceded the one above it by millions of years. That would completely miss the fact that all these forms exist at the same time right now.

The previously discussed explosion of Mt. St. Helens and the consequent filling of Spirit Lake is a great example of how geologic findings can be misinterpreted. Massive flooding and landslides over a few days caused acres of trees to be buried vertically in layers one atop another. This was a condition which had previously only been interpreted as separate forests succeeding one another by hundreds of thousands of years. This observed event proves with certainty the plausibility of a sudden-burial explanation for layered fossils of creatures that may well have coexisted.

5.) If, as fellow evolutionists charge and as Gould and Eldredge admit, punctuated equilibria has no clear evidence and is not observable or falsifiable, then, like Darwinian evolution, punctuated equilibria is a matter of blind faith, not testable science.

To believe in this theory, one must almost begin with the premise that evolution is true:

- Macro-evolution happened.
- Therefore, if it cannot be proven to have happened slowly according to Darwin, and...
- it cannot be proven to have happened quickly according to Goldschmidt, and...
- it cannot be recreated, predicted, observed, or evidenced, then...
- it happened in some unobservable, non-evidencing, improbable kind of way.

Interestingly, it is just such a non-evidencing, improbable kind of way that
describes the third and most recent evolutionary idea: Directed Panspermia.

g. Directed Panspermia

"Any sufficiently advanced technology is indistinguishable from magic."

ARTHUR C. CLARK

"A commonsense interpretation of the facts suggests that a superintellect has monkeyed with physics, as well as with chemistry and biology, and that there are no blind forces worth speaking about in nature."

FRED HOYLE

1. Evolution theory #3: Directed Panspermia

Francis Crick, Nobel co-recipient for the discovery of DNA, credits Leslie Orgel as having assisted him in developing his theory of Directed Panspermia. This theory does something its two predecessors failed to do: it offers an explanation of the presence of life on earth in a manner that is consistent with the fossil record.

While Crick and Orgel's work on the theory of Directed Panspermia concentrated on the origin of life, modifications to the theory have subsequently been offered by Hoyle and Wickramasinghe. Their modifications round out the explanation of how life forms, such as humans, have come to exist on this planet.

Because Directed Panspermia is the latest non-biblical theory for the origin of humanity, it is not found in many older textbooks and, consequently, is not as widely known as are Darwin's nineteenth century beliefs. Though it may be unfamiliar, this new theory is worth close study because it largely came about due to atheistic scientists' refusal to tolerate the fallacies of traditional evolutionary thinking.

— FRANCIS CRICK'S THEORY ON THE ORIGIN OF DNA

Darwinian evolution and Punctuated Equilibria both assume the origin of life to be the chance result of random chemical combinations early in earth's history. That combination is believed by evolutionists to be some form of DNA - the discovery of Francis Crick and James Dewey Watson. DNA, deoxyribonucleic acid, is the foundational molecule of every life form on earth. Any single human DNA contains the information to direct all the one hundred trillion cells in the human body. It also has the capability of both reproducing and repairing itself. It is a molecular chain of approximately one billion nucleotides (combination strings of four specific chemicals which function like computer code.)

Francis Crick's work with DNA afforded him knowledge and observations unavailable to previous evolutionists. Specifically, Crick

- knew of the astonishing complexity of DNA,
- researched and confirmed the absence of evidence for a primordial soup,
- observed that life appears suddenly and with complexity in the fossil record, and
- confirmed the absence of any fossil evidence for transitional forms of life.

He then concluded this about life beginning by evolution:

An honest man, armed with all the knowledge available to us now, could only state that in some sense, the origin of life appears at the moment to be almost a miracle...

Well, Dr. Crick does not endorse miracles or even the slightest belief in God as he declares in no uncertain terms in chapter fifteen of his book Life Itself. This co-discoverer of DNA instead puts forth what he considers to be a more plausible theory for the origin of life and man. Crick explains:

Directed Panspermia - postulates that the roots of our form of life go back to another place in the universe, almost certainly another planet; that it had reached a very advanced form there before anything much had started here; and that life here was seeded by microorganisms sent on some form of spaceship by an advanced civilization.

According to Crick, this is the only alternative that satisfactorily explains what Darwinism and punctuated equilibria do not - this planet's absence of transitional forms; transitional forms being the evidence for evolution which, "would only have existed on the sender planet, not on earth."

Dr. Crick then informs us what to expect of the fossil record:

The main difference would be that microorganisms should appear here suddenly, without any evidence for prebiotic systems or very primitive organisms. Now, it is perhaps remarkable that these are all features of the early fossil record. He concludes, "Thus, at the very least one can say that this evidence does not
contradict Directed Panspermia but supports it to some extent.\[^{[44]}\]

2. The Latest Update

Since the introduction of Dr. Crick's version of Directed Panspermia, the theory has been modified slightly by Fred Hoyle and Chandra Wickramasinghe. These two scientists discount the belief that any alien spacecraft brought life to this planet. They instead propose that complex genes, the genes that appear early and abruptly in earth's history, were manufactured by some intelligence and released into space. Those genes then were set adrift into space like dandelion seeds on windy spring day.

At select moments in history, and perhaps in the future, these genes, acting like highly sophisticated and autonomous computer programs, "rain gently from space into the environment, each fragment being a small program in itself."\[^{[45]}\] Those that survive entry into the atmosphere waft across the planet, eventually coming into contact with one or more pre-established organisms. Upon contact, the new gene reprograms the old organism such that, when the organism reproduces, the organism's offspring will exhibit improvements proportionate to the degree of the genetic upgrade installed by the incoming gene.

Hoyle offers that this conjecture, unlike all previous theories, finally explains the total absence of transitional forms in the fossil record. Continuing the analogy to computer programming, Hoyle states:

> We saw there that intermediate forms are missing from the fossil record. Now we see why, essentially because there were no intermediate forms. When a computer is upgraded there are no intermediate forms. The new units are wheeled in beside the old computer, the electrical connections are made, the electric power is switched on, and the thing is done.\[^{[46]}\]

3. Problems with Directed Panspermia: "No Chance"

Life, even on the sender planet, could not have arisen by accident. One of the strongest arguments against Directed Panspermia comes from Hoyle and Wickramasinghe themselves. Their subsequent investigations into the details of this theory are now widely used as some of the more powerful science-based reasons for the credulity of creationism. Here is what they found. Crick had admitted that the evolution of life from lifelessness could never have occurred on this planet, so his conception of Directed Panspermia assumed that conditions were amenable to evolution on some other planet in the universe. He states:

> It could be argued that Directed Panspermia merely transfers the

problem elsewhere. This is partly true, but for all we know the location was vital.\[^{[47]}\]

Since "for all we know" is by no means a proper scientific measurement of the probability of life to have arisen by chance, it is worthwhile that Hoyle and Wickramasinghe decided to compute that exact probability. Their goal was to quantify the chances of life being formed by a random co-location of molecules based upon everything known about organic components, DNA, astronomy, physics, and requirements for the existence of life.

NO CHANCE OF ACCIDENTAL LIFE

Knowing that no primordial soup existed on earth, Hoyle and Wickramasinghe did not limit their calculations to just this planet, but looked at the probability of life to form anywhere in the universe. Hoyle summarizes what they found concerning the likelihood of an accidental formation of the most basic DNA:

> The trouble is that there are about two thousand enzymes, and the chance of obtaining them all in a random trial is only one part in (1020)(2000) = 1040,000, an outrageously small probability that could not be faced even if the whole universe consisted of organic soup.

If one is not prejudiced either by social beliefs or by a scientific training into the conviction that life originated on the Earth, this simple calculation wipes the idea entirely out of court... Even the need for only two enzymes to operate in association is sufficient to make the situation quite implausible... There is no way in which we can expect to avoid the need for information, no way in which we can simply get by with a bigger and better organic soup...\[^{[48]}\]

Wickramasinghe concurs in a separate work:

> It doesn't follow logically that one can start from an organic soup and end up with a living system. There's no logic that drives you to that conclusion at all... There's not enough time, there's not enough resources and there's no way in which that could have happened...\[^{[49]}\]

Stephen C. Meyer has more recently broken down the probability along slightly different lines, for a small protein molecule, but to the same conclusion:

1. "The probability of building a chain of 100 amino acids in which all linkages involve peptide bonds is roughly 1 chance in 1030."
2. "The probability of attaining at random only L-amino acids in a hypothetical peptide chain 100 amino acids long is (1/2)(100 or again roughly 1 chance in 1030." [Only left-handed amino acid arrangements can be tolerated by functioning proteins]
3. "...we find that the probability of achieving a functional sequence of amino acids in several functioning proteins at random is still "vanishingly small," roughly 1 chance in 10^65 - an astronomically large number - for a protein only one hundred amino acids in length."

4. "If one also factors in the probability of attaining proper bonding and optical isomers, the probability of constructing a rather short, functional protein at random becomes so small as to be effectively zero (no more than 1 chance in 10^125)."

What all this means is that one could just go to Crick's planet asking how life there was any better able to originate than on earth, and be forced to conclude that planet was seeded by yet a previous planet, and so on and so forth... ad infinitum. This logical fallacy of infinite regression does not escape Hoyle who points out that, in a finite universe such as ours, any seemingly infinite regression simply must have an "idealized limit".

This limit, this point at which the progression of life actually began, Hoyle tentatively acquires to call "God", though not in the biblical sense. He allows the origin of life to be attributed to "God" for the reason that the technical origin of life is logically unknowable because its probability as a natural occurrence is impossible. Hoyle and Wickramasinghe writes:

But in that dawn of certainty, in what might have been a moment of satisfaction, we hit a difficulty that knocked the stuffing out of us. No matter how large the environment one considers, life cannot have had a random beginning. Just as the brain of Shakespeare was necessary to produce the famous plays, so prior information was necessary to produce a living cell. But information from where?

This demonstrates that a science-only approach to discovering the origin of life yields an answer which unsettles anti-theists. It legitimately opens the door to the possibility of divine creation. Science has arrived at a God-friendly conclusion on origins. As Chandra Wickramasinghe insightfully observes:

But the universe doesn't respect the boundaries between different disciplines. The differences between biology and astronomy and chemistry and so on, these are man-made artifacts of thinking. I think the whole system is doomed unless one decides that all these barriers are cleared. And I will go further to say that even the interface between theology and the other disciplines in necessary.

II. The Notion of Scientific Truth.

And ye shall know the truth and the truth shall make you free.

— John 8:32 (KJV)

a. General Introduction

Marxism has an engaged notion of truth. For them, "Truth" is not 'out there,' waiting to be 'discovered.' Truth is made, not born, not found. To quote from the Theses on Feuerbach:

The question whether objective truth can be attributed to human thinking is not a question of theory but is a practical question. Man must prove the truth, i.e., the reality and power, the this-sidedness (Diesseitigkeit) of his thinking, in practice. . .

The question turns, of course, on the meaning of made. Truth is forged (made, created) through interaction with the world (through practice). Truths don't exist beforehand, but arise out of that interaction. Obviously this doesn't mean you can make true whatever you desire it to be, or think should be, true. To declare truth is not to make truth, even though truth is made. . . .

There are things that follow from the fact that truth is made. (And there are things that don't.) There is no 'objective truth' already there. Whatever objectivity we achieve is just that: achieved and forged, not discovered. If truth arises through interaction with the world—human interaction—then there is no truth that is not made by human beings, and there is no truth other than from the human perspective, the perspective of human beings, living historically and enmeshed in the world. (There is no perspective outside the world, no god-viewpoint outside of creation and time.) If all truth is human truth (leaving aside the question of other intelligent life in the cosmos), then there would be no truths had not human beings come into existence; the world of course would be there in whatever shape and configuration it would take, but without consciousness as an interactive part of this world, no
truths would be formed and forged. 

We forge truths through practice. The criterion of their being true (what makes them true) is their relation to the world. Our method of knowing and testing their truth again involves, in the end, practice. 

In the Nine Letters we point out that our ideas emerge, quoting Engels, 'from individual human beings with their extremely limited thought.' Letter 4 continues: 'Truth is not just "out there" like a ripened fruit waiting to be plucked and delivered whole.' Truths have to be won and developed through struggle, and this struggle very often has a class character. The truths that emerge — partial, relative truths, to be sure — are also stamped with a class character. 

I think that what Steele says here is generally correct, and points to what I want to develop in this section of the book. But before moving to the question of class truth specifically, we should look a little more at truth in general. Understanding the concept of truth is necessary for understanding the concept of class truth. If there is no well-grounded, dialectical theory of truth, then there cannot be a valid theory of class truth either. The attempt to "skip over" the general question of truth, and go to class truth directly, undercuts the possibility of attaining a thorough understanding of class truth — and is one of the tactics adopted by some of its critics.

The contemporary culture is proud of its knowledge that never ceases to progress, but at the same time it shares a deep mistrust for the traditional idea of truth. There is a growing awareness of the fragmentary and revisable character of all cognition and of the impossibility to form a synthetic vision of an ever-growing disparate body of knowledge.

Everything happens as if the truth which, in the past, was considered of easy access to people of good will, has become more problematic with the progressive decline of ignorance. This new situation must be regarded as a positive discovery, namely, the growing awareness that reality is complex, that our understanding of reality is itself limited and partial and that, on account of the multiplicity of perspectives, it is impossible to grasp a partial aspect of the real without masking other aspects. There is a suspicion on the concept of "Truth" with a capital T, on the idea of an absolute Truth that would free the human mind from all doubts concerning the meaning of existence in its totality. The modern mind turns away from this traditional concept of Truth, whether religious or philosophical and cries out: What is truth? Are religious or spiritual beliefs different in kind from scientific or commonsense beliefs? Is truth absolute? (And if not, is that an absolute truth?)

In reality, the relationship between truth and theory is at the very heart of science, determining when, and if, a theory becomes accepted as reality is one of the truist of this section. Whilst most scientists and philosophers accept that absolute truth is unobtainable, there has been intense debate about exactly what constitutes proof. This argument is closely related to the realism and antirealism debate, which questions the nature of reality.

Scientists gradually approach the truth, by refining and adapting theories, whilst understanding that they will never find perfect proof. We shall be considering this as well. We all seek the truth, yet pursue it differently. Are humans allowed to search for the truth? According to the above quote from The Holy Bible, in the beginning of this section, Jesus expects us to. But how do we search for truth? And how will we recognize it if and when we find it? With so many possibilities, some theorists argue that truth itself is relative. Since everybody has an opinion, reality is subjective to individual perceptions. But for now, I'll only address the scientific method and explain the difference between facts, hypotheses, theories, and laws. I also want to describe how knowledge itself evolves.

b. Conceptual And Etymological Analysis of the concept of Truth

Truth has a variety of meanings, such as the state of being in accord with a particular fact or reality, or being in accord with the body of real things, real events or actualities. It can also mean having fidelity to an original or to a standard or ideal. In a common archaic usage, it also meant constancy or sincerity in action or character. The direct opposite of truth is falsehood, which can correspondingly take logical, factual or ethical meanings.

From whichever way you look at it, "truth" must have a beneficial use in order to be retained within language. Defining this potency and applicability can be looked upon as "criteria", and the method used to recognize a "truth" is termed a criterion of truth. Since there is no single accepted criterion, they can all be considered "theories". Various theories and views of truth continue to be debated among scholars and philosophers. There are differing claims on such questions as
what constitutes truth; what things are truthbearers capable of being true or false; how to define and identify truth; the roles that revealed and acquired knowledge play; and whether truth is subjective or objective, relative or absolute.

The English word **true** is from Old English **(West Saxon)** *ge(tr)eowe*, **træowe**, cognate to Old Saxon *gitsrui*, Old High German *ga(tr)iuwu* (Modern German *treu* "faithful"), Old Norse **trygg**, Gothic **trigwus**, all from a Proto-Germanic *trewj/ij*: "having good faith". Old Norse **trú**, "faith, word of honour; religious faith, belief" [archaic English *true* "loyalty, honesty, good faith"]. Thus, 'truth' involves both the quality of "faithfulness, fidelity, loyalty, sincerity, veracity", and that of "agreement with fact or reality", in Anglo-Saxon expressed by **sóp** (Modern English **sooth**).

All Germanic languages besides English have introduced a terminological distinction between truth "fidelity" and truth "factuality". To express "factuality", North Germanic opted for nouns derived from **sanna** "to assert, affirm", while continental West Germanic (German and Dutch) opted for continuations of **vēra** "faith, trust, pact" (cognate to Slavic *vēra* "(religious) faith", but influenced by Latin **verus**). Romance languages use terms following the Latin **veritas**, while the Greek **aletheia**, Russian **pravda** and Serbian **istina** have separate etymological origins.

c. Major Theories of Truth

Thinkers such as Quine is also known for his rejection of the analytic-synthetic distinction of truth. The traditional view had always been - as represented in the works of Kant and Leibniz - that there are two concepts of truth: the analytical truths and the synthetic truths, also known as 'the truth of reason', (a priori) and 'the truth of facts' (a posteriori). A statement is analytic when it is true by virtue of meaning and independently of facts. A statement is synthetic when it is true by virtue of facts. It is a matter of either meaning or fact. Hence a fundamental cleavage between truths which are analytic, grounded in meanings and truths which are synthetic, grounded on facts.

These distinctions and more had become the basis for which thinkers and philosophers have been preoccupied with The question of what are a proper basis for deciding how words, symbols, ideas and beliefs may properly be considered true, whether by a single person or an entire society, is dealt with by the five major substantive theories that we shall be discussing below. Each theory presents perspectives that are widely shared by published scholars. There also have more recently arisen "deflationary" or "minimalist" theories of truth based on the idea that the application of a term like true to a statement does not assert anything significant about it, for instance, anything about its nature, but that the label truth is a tool of discourse used to express agreement, to emphasize claims, or to form certain types of generalizations.


Under the **Minimalist (deflationary) Theories of truth** we shall be discussing; 1. the performative theory of truth and the Redundancy and related theories of truth. We shall also consider briefly, the Pluralist theories and the Formal theories of truth were we'll talk about truths in Logic, truths in Mathematics and Semantics theories.

1. Substantive Theories

A. Correspondence Theory: Bertrand Russell was known to have been one of the first to popularize the correspondence theory of truth in his numerous writings. Others include. G. E. Moore and Alex Taski. Correspondence theories state that true beliefs and true statements correspond to the actual state of affairs. This type of theory posits a relationship between thoughts or statements on the one hand, and things or objects on the other. It is a traditional model which goes back at least to some of the classical Greek philosophers such as Socrates, Plato, and Aristotle. This class of theories holds that the truth or the falsity of a representation is determined in principle solely by how it relates to "things", by whether it accurately describes those "things". An example of correspondence theory is the statement by the Thirteenth Century philosopher/theologian Thomas Aquinas: *Veritas est adeaequatio rei et intellectus* ("Truth is the equation [or adequation] of things and intellect"), a statement which Aquinas attributed to the Ninth Century neoplatonist Isaac Israeli. Aquinas also restated the theory as: "A judgment is said to be true when it conforms to the external reality". Correspondence theory practically operates on the assumption that truth is a matter of accurately copying what was much later called "objective reality" and then representing it in thoughts, words and other symbols.

Criticisms: Many modern theorists have stated that this ideal cannot be achieved independently of some analysis of additional factors. For example, language plays a role in that all languages have words that are not easily translatable into another. The German word **Zeitgeist** is one such example: one who speaks or
understands the language may "know" what it means, but any translation of the
word apparently fails to accurately capture its full meaning (this is a problem with
many abstract words, especially those derived in agglutinative languages). Thus,
some words add an additional parameter to the construction of an accurate truth
predicate. Among the philosophers who grappled with this problem is Alfred
Tarski, whose semantic theory is summarized further below in this article.\[10\]

B, Coherence Theory: Rationalist Metaphysicians such as Leibniz, Spinoza,
Hegel and F. H. Bradley where known to have championed the Coherence theory
of truth. For coherence theories in general, truth requires a proper fit of elements
within a whole system. Very often, though, coherence is taken to imply something
more than simple logical consistency; often there is a demand that the
propositions in a coherent system lends mutual inferential support to each other.
So, for example, the completeness and comprehensiveness of the underlying set
of concepts is a critical factor in judging the validity and usefulness of a coherent
system.\[10\] A pervasive tenet of coherence theories is the idea that truth is
primarily a property of whole systems of propositions, and can be ascribed to
individual propositions only according to their coherence with the whole. Among
the assortment of perspectives commonly regarded as coherence theory,
thorists differ on the question of whether coherence entails many possible true
systems of thought or only a single absolute system.

Some variants of coherence theory are claimed to characterize the essential
and intrinsic properties of formal systems in logic and mathematics.\[10\] However,
formal reasoners are content to contemplate axiomatically independent and
sometimes mutually contradictory systems side by side, for example, the various
alternative geometries.

Criticisms: On the whole, coherence theories have been criticized as lacking
justification in their application to other areas of truth, especially with respect to
assertions about the natural world, empirical data in general, assertions about
practical matters of psychology and society, especially when used without support
from the other major theories of truth.\[10\]

C, Constructivist Theory: Social constructivism holds that truth is constructed
by social processes, is historically and culturally specific, and that it is in part
shaped through the power struggles within a community. Constructivism views all
of our knowledge as "constructed," because it does not reflect any external
"transcendent" realities (as a pure correspondence theory might hold). Rather,
perceptions of truth here are viewed as contingent on convention, human
perception, and social experience. It is believed by constructivists that
representations of physical and biological reality, including race, sexuality, and
gender are socially constructed. (In other words, the society determines how a
thing can be conceived irrespective of the way another community may see it).

Giambattista Vico was among the first to claim that history and culture were man-
made. Vico's epistemological orientation gathers the most diverse rays and
unfolds in one axiom — verum ipsum factum — "truth itself is constructed". Hegel
and Marx were among the other early proponents of the premise that truth is, or
can be, socially constructed. Marx, like many critical theorists who followed, did
not reject the existence of objective truth but rather distinguished between true
knowledge and knowledge that has been distorted through power or ideology.
For Marx, scientific and true knowledge is 'in accordance with the dialectical
understanding of history' and ideological knowledge 'an epiphenomenal
expression of the relation of material forces in a given economic arrangement.'\[10\]

D, Consensus Theory: Consensus theory holds that truth is whatever is agreed
upon, or in some versions, might come to be agreed upon, by some specified
group. Such a group might include all human beings, or a subset thereof consisting
of more than one person.

Among the current advocates of consensus theory as a useful accounting of the
concept of "truth" is the philosopher Jürgen Habermas.\[10\] Habermas maintains
that truth is what would be agreed upon in an ideal speech situation.\[10\]

The declaration independence of the United states of America is a good example:
The United States Declaration of Independence is a statement adopted by the
Continental Congress on July 4, 1776, which announced that the thirteen
American colonies then at war with Great Britain were now independent states,
and thus no longer a part of the British Empire. Written primarily by Thomas
Jefferson, the Declaration is a formal explanation of why Congress had voted on
July 2 to declare independence from Great Britain, more than a year after the
outbreak of the American Revolutionary War. The birthday of the United
States of America — Independence Day — is celebrated on July 4, the day the wording
of the Declaration was approved by Congress. Its stature grew over the years,
particularly the second sentence, a sweeping statement of human rights:

We hold these truths to be self-evident, that all men are created equal,
that they are endowed by their Creator with certain unalienable Rights,
that among these are Life, Liberty and the pursuit of Happiness.

This sentence has been called "one of the best-known sentences in the English
language" and "the most potent and consequential words in American history."\[10\]

The passage has often been used to promote the rights of marginalized people,
and came to represent a moral standard for which the United States should strive.
This view was notably promoted by Abraham Lincoln, who considered the Declaration to be the foundation of his political philosophy,¹⁶ and argued that the Declaration is a statement of principles through which the United States Constitution should be interpreted. The quotation above is a typical example of a consensus theory of truth.

Among the current strong critics of consensus theory is the philosopher Nicholas Rescher.³⁷

E, Pragmatic theory: The three most influential forms of the pragmatic theory of truth were introduced around the turn of the 20th century by Charles Sanders Peirce, William James, and John Dewey. Although there are wide differences in viewpoint among these and other proponents of pragmatic theory, they hold in common that truth is verified and confirmed by the results of putting one’s concepts into practice.⁴⁰

Peirce defines truth as follows: "Truth is that concordance of an abstract statement with the ideal limit towards which endless investigation would tend to bring scientific belief, which concordance the abstract statement may possess by virtue of the confession of its inaccuracy and one-sidedness, and this confession is an essential ingredient of truth."⁴⁰ This statement emphasizes Peirce’s view that ideas of approximation, incompleteness, and partiality, what he describes elsewhere as falsibilism and “reference to the future”, are essential to a proper conception of truth. Although Peirce uses words like concordance and correspondence to describe one aspect of the pragmatic sign relation, he is also quite explicit in saying that definitions of truth based on mere correspondence are no more than nominal definitions, which he accords a lower status than real definitions.

William James’s version of pragmatic theory, while complex, is often summarized by his statement that “the ‘true’ is only the expedient in our way of thinking, just as the ‘right’ is only the expedient in our way of behaving.”⁴⁰ By this, James meant that truth is a quality the value of which is confirmed by its effectiveness when applying concepts to actual practice (thus, "pragmatic").

John Dewey, less broadly than James but more broadly than Peirce, held that inquiry, whether scientific, technical, sociological, philosophical or cultural, is self-corrective over time if openly submitted for testing by a community of inquirers in order to clarify, justify, refine and/or refute proposed truths.⁴⁰

Though not widely touted nor publicized, a new variation of the pragmatic theory was defined and wielded successfully from the 20th century forward. Defined and named by William Hocking, this variation is known as “negative pragmatism”.

Essentially, what works may or may not be true, but what fails cannot be true because the truth always works. Richard Feynman also ascribed to it: "We never are definitely right, we can only be sure we are wrong."⁴⁰ This approach incorporates many of the ideas from Peirce, James, and Dewey. For Peirce, the idea of "... endless investigation would tend to bring about scientific belief ..." fits negative pragmatism in that a negative pragmatist would never stop testing. As Feynman noted, an idea or theory "... could never be proved right, because tomorrow’s experiment might succeed in proving wrong what you thought was right."⁴⁰ Similarly, James and Dewey’s ideas also ascribe to repeated testing which is "self-corrective" over time.

2. Minimalist (deflationary) theories

Under this theory of truth is a theory attributed by P. F. Strawson: The Performativistic theory of truth. This theory of truth holds that to say "Snow is white" is true is to perform the speech act of signaling one’s agreement with the claim that snow is white (much like nodding one’s head in agreement). The idea that some statements are more actions than communicative statements is not as odd as it may seem. Consider, for example, that when the bride says "I do" at the appropriate time in a wedding, she is performing the act of taking this man to be her lawful wedded husband. She is not describing herself as taking this man, but actually doing so (perhaps the most thorough analysis of such illocutionary acts) is J. L. Austin, "How to Do Things With Words."⁴⁰

Strawson holds that a similar analysis is applicable to all speech acts, not just illocutionary ones: "To say a statement is true in not to make a statement about a statement, but rather to perform the act of agreeing with, accepting, or endorsing a statement. When one says 'it's true that it's raining,' one asserts no more than 'it's raining.' The function of [the statement] 'it's true that...' is to agree with, accept, or endorse the statement that 'it's raining.' "⁴⁰

3. Formal Theories

A, Truth in logic: Logic is concerned with the patterns in reason that can help tell us if a proposition is true or not. However, logic does not deal with truth in the absolute sense, as for instance a metaphysician does. Logicians use formal languages to express the truths which they are concerned with, and as such there is only truth under some interpretation or truth within some logical system.

A logical truth (also called an analytic truth or a necessary truth) is a statement which is true in all possible worlds⁴⁰ or under all possible interpretations, as contrasted to a fact (also called a synthetic claim or a contingency) which is only
true in this world as it has historically unfolded. A proposition such as "If p and q, then p." is considered to be logical truth because it is true because of the meaning of the symbols and words in it and not because of any facts of any particular world. They are such that they could not be untrue.

B, Truth in mathematics: There are two main approaches to truth in mathematics. They are the model theory of truth and the proof theory of truth. Historically, with the nineteenth century development of Boolean algebra, mathematical models of logic began to treat "truth", also represented as "T" or "1", as an arbitrary constant. "Falsity" is also an arbitrary constant, which can be represented as "F" or "0". In propositional logic, these symbols can be manipulated according to a set of axioms and rules of inference, often given in the form of truth tables.

In addition, from at least the time of Hilbert's program at the turn of the twentieth century to the proof of Gödel's theorem and the development of the Church-Turing thesis in the early part of that century, true statements in mathematics were generally assumed to be those statements which are provable in a formal axiomatic system.

C, Semantic Theory of Truth: The semantic theory of truth has as its general case for a given language:

'P' is true if and only if P

where 'P' is a reference to the sentence (the sentence's name), and P is just the sentence itself.

Logician and philosopher Alfred Tarski developed the theory for formal languages (such as formal logic). Here he restricted it in this way: no language could contain its own truth predicate, that is, the expression is true could only apply to sentences in another language. The latter he called an object language, the language being talked about. (It may, in turn, have a truth predicate that can be applied to sentences in still another language.) The reason for this restriction was that languages that contain their own truth predicates will contain paradoxical sentences like the Liar: This sentence is not true. As a result, Tarski held that the semantic theory could not be applied to any natural language, such as English, because they contain their own truth predicates. Donald Davidson used it as the foundation of his truth-conditional semantics and linked it to radical interpretation in a form of cohercism.

Bertrand Russell is credited with noticing the existence of such paradoxes even in the best symbolic formalizations of mathematics in his day, in particular the paradox that came to be named after him, Russell's paradox. Russell and

Whitehead attempted to solve these problems in Principia Mathematica by putting statements into a hierarchy of types, wherein a statement cannot refer to itself, but only to statements lower in the hierarchy. This in turn led to new orders of difficulty regarding the precise nature of types and the structures of conceptually possible type systems that have yet to be resolved to this day.

d. Scientific Truths

In our introduction to this section we admit that even the scriptures allow us to search for the truth in an objective manner that will be in line with reality. The application of scientific methods over all other methods-reason, method, etc-we shall argue here, makes for an objective discovery of the truth.

The scientific method is observation. Observations are plain facts. We observe, for example, that fire gives off heat and light. Webster defines a fact as "the state of things as they are; reality; actuality; truth." Before we search for the larger truth, we must first accumulate small truths. Science grows by gathering singular, simple, facts. Soon, observations lead to questions. Suppose you watch an ant scurry over your kitchen table. You might ask, "Where did it come from?" and "What's it doing here?" and finally, "Is that the only ant in my kitchen?" If you're imaginative, you might assume that the ant is looking for food since it's on your kitchen table. From here, you probably advanced your observation to a new stage—you've just formed a hypothesis.

Webster defines a hypothesis as "an unproved proposition tentatively accepted to explain certain facts or to provide a basis for further investigation." Whenever you suggest an explanation for an unanswerable question, you've taken part in the scientific method. Science always tries to explain why things happen, and proposes new hypotheses to accomplish that. But how do we know if a hypothesis is true? In his Lectures on Physics, physicist Richard Feynman says, "The principle of science, the definition, almost, is the following: The test of all knowledge is experiment. Experiment is the sole judge of scientific Truth."

For example, you can test your hungry ant hypothesis. Put some food in the ant's path and watch what happens. If the ant stops and eats your food, your hypothesis looks promising. If it ignores the crumb, your hypothesis falters. But some experiments produce unexpected results. If the ant picks up the crumb and carries it off the table, what does that mean? Could there be another hypothesis to explain why the ant didn't eat the food? Should you reject your original hypothesis? Somehow, you must revise your original explanation to address your
experimental results.

Remember “Cold Fusion?” That hypothesis tried to explain how an unexpected amount of heat followed a chemical reaction. Other chemists tried to duplicate that experiment, but nobody could duplicate the same results. Scientists then offered a new hypothesis to explain what went wrong with the original experiment. When two hypotheses contradict one another, at least one of them is wrong. Indeed, the entire universe does not contradict itself. Scientists must reason, or use the process of elimination, to decide which of two or more scientific experiments best explains an observation. In other words, your hypothesis must fit all the facts. Since nobody else could reproduce the original cold fusion results, including the scientists who first reported them, the (proposed) theory of cold fusion turned out to be wrong.

Hypotheses that survive experimental scrutiny are subjected to more rigorous tests. The original idea is examined, twisted, dissected, criticized, and re-tested. If any test refutes a proposed hypothesis, that hypothesis must be discarded or modified to account for the new facts. As evidence is gathered, as facts are compiled, as experiments are undertaken, the working hypothesis gains support. Little by little, a hypothesis becomes a theory. The scientific method demands that, when new evidence comes to light, the theory must change to accommodate that new evidence.

Consider gravity, for example. Sir Isaac Newton first hypothesized a law for gravitational attraction over three hundred years ago, and it withstood all challenges until we discovered that the speed of light is a constant. Suddenly, Newton’s theories didn’t reconcile all the known facts. Albert Einstein modified the theory (by now called the law) of gravity to explain all these new observations. But Newton’s Laws of Gravitation are still relevant. Einstein only added a refinement to a realm (known as Relativity) that’s rarely observed in the familiar world. Einstein didn’t throw away three hundred years of observation and testing. (Don’t forget that any new theory must accommodate the old facts, too.) Instead, new knowledge is built on top of previous knowledge. Einstein only tailored Newton’s Laws to fit the new facts. The old facts are still functional, and Relativity barely altered Newton’s findings.

This is where many people get flustered. How do you distinguish between a theory and law? Actually, there are two related definitions of “theory.” Most people assume a “theory” is something that’s a “mere hypothesis, conjecture or guess.”

But in science, it specifically means “a formulation of apparent relationships or underlying principles of certain observed phenomena which have been verified to some degree.”

Indeed, the distinction is important enough that Webster devotes no less than ten lines to distinguish between these words with the following (here, abbreviated) notes:

1. **Hypothesis** — An inadequacy of evidence in support of an explanation.
2. **Theory** — Considerable evidence in support of a formulated general principal (as in the theory of evolution).
3. **Law** — Implies an exact formulation of the principle (as in the law of the conservation of energy).

In science, a **theory** carries a great deal of weight. Theories are backed by an incredible number of facts. As Webster implies, to dismiss evolution as “only a theory” is to grossly abuse the language. That’s like claiming Thomas Jefferson was “only a farmer.”

Stated simply, this is how the scientific method progresses:

1. **Observations lead to questions**
2. **Questions lead to tentative answers**
3. **Answers are tested in a laboratory, in the classroom, or in the field**
4. **Tests lead to modifications, and yet more tests**
5. **Modifications ultimately lead to theories**
6. **Theories lead to laws.**

The law of gravity and the theory of evolution, for example, both lead to the Truth. Newton and Darwin’s ideas have both been refined and tested for more than 150 years in every laboratory around the world. Science demands that all observations be accounted for. Any new theory must build upon existing data. Newton’s formulas and Darwin’s vigilant observations still demand a consistent explanation.

By searching for truth, we can understand how the world works. We can then learn how to change the way the world works, and discover how our observations, in turn, alter that world.

By starting with facts or “little truths,” we build a self-consistent representation of the universe that we’ve always observed. The more we learn about our world, the more insight we gain about ourselves. We can answer questions today that our parents weren’t aware of. Hopefully, our children will build on that knowledge.
and, eventually, expose larger truths. Truth is ultimately found through a slow, incremental, step-by-step process of elimination—not divine revelation.

e. The Truth About Scientific Endeavor and Ways of Finding The Truth

1. Science as a Human Endeavor

We probably won’t have time to analyze fully the evidence for every claim made in this course but keep in mind that this critical attitude lies behind all the explanations presented. Science does not claim to know all the answers. It does, however, claim to provide us with a method of test and interaction by which we can become more and more intimate with the physical universe.

Because science is done by human beings, many aspects of our humanity also play a role in scientific discovery: artistic creation and imagination, political manipulation and personal exploitation, wishful thinking, bias, egocentricity, critical review, and premature skeptical rejection. At its best, however, there is only one absolute truth: that there are no absolute truths. Every solution to a mystery creates new mysteries. Science is a game that never ends, a game whose completion would render life boring. Science then involves a logical process that is fallible, and it involves much more than just a logical process. Every scientist and the science of a time are subject to the forces of human nature and culture. Scientists are forced to make many assumptions; some are conscious and some are not.

2. Assumptions of Scientists

Let’s take a brief look at some these assumptions or philosophical backdrop. Many scientists today will claim they are interested in how things work, not why they work as they do, because a scientist’s task is to conduct experiments, make observations, and find mathematical connections. Influenced by a philosophical tradition known as positivism, these scientists will want to know what atoms will do, for instance, not what they are. Or, rather than trying to understand why gravity is attractive and not repulsive, these scientists figure out how the gravitational attraction affects the interaction of objects. Another position held by many (but not all) scientists consciously or unconsciously is known as materialism. Metaphysical materialism states that there is no evidence that anything called “mind” exists and that all that exists are concrete material things, forces, and empty space. However, the scientific method does not depend necessarily upon making this assumption. Some have argued that recent developments in physics and neurophysiology warrant a reexamination of this question.

Some scientists have even held a position that is a form of classical idealism, believing that the universe can be best understood by assuming that “thought” or “consciousness” is the most fundamental reality. Certain mathematical concepts are ideas in the mind of God and that any physical reality, such as the motion of a planet, must conform to these ideas.

3. Materialism: Methodology vs. Philosophy

Let’s look at the materialism assumption a bit more closely since it is a source of major conflict (in the United States at least). For this section, I use material from Eugene C. Scott’s book Evolution vs. Creationism: An Introduction.

Modern day scientists purposefully limit themselves to explaining natural phenomena using only natural causes. We have learned a lot about our world, our universe, by adopting a methodology of materialism, limiting ourselves to just matter, energy and their interactions. Adopting a materialistic methodology when doing science does not necessarily lead to metaphysical or philosophical materialism. There have been many theist (not atheist!) scientists who practiced a materialistic methodology and this continues even today.

Why do scientists limit themselves to materialistic explanations? Several reasons: The empiricism of modern science, the testing of explanations, relies on the regularity of nature, that nature does follow rules or laws. Otherwise, we could not trust observations as evidence. How would we know if the observation was not the result of some supernatural whim? Controlled, repeatable experimentation would not be possible and any conclusions from them would not be reliable without assuming that supernatural entities are not intervening to violate natural regularities or laws. (Pennock quoted in Scott p. 249) Secondly, relying on supernatural explanations is a cop-out or a dead-end to deepening our understanding of the natural world. There would be no reason to continue looking for a natural explanation. When confronted with a very hard problem due to an inadequate theory or technology, we do not throw up our hands and say, “God did it” and leave it at that—end of inquiry. No, if a natural cause for something is not known, the scientific approach is to say, “I don’t know yet” and keep on looking. Finally, the “methods of science are inadequate to test explanations involving supernatural forces” (Scott p. 50). It is hard to do controlled experiments if one of the control variables is an omnipotent force. The scientist usually learns about nature by using controlled experiments in which only one thing at a time is varied to determine whether or not a particular situation, feature, or circumstance can
be determined to be the cause of an observed effect. Well, as any theologian will
tell you, you can't control God, "the More". You can't put God in a box (or test
tube).

4. Ways of finding the truth

Some science critics claim that science is absolute and dogmatic in terms of how it
approaches the best way of knowing something. Much of our personal knowledge is
based upon testimony. Someone may tell me that Bogus Basin, just 30 minutes
from Boise, ID, has great skiing. If I believe this even though I have only skied at
Snoqualmie or Stevens Pass, my belief is based on testimony. Sometimes the
testimony is based on authority, as would be the case if an Olympic gold medalist
told me about Bogus Basin. Many religions claim that revelation is a valid method
of knowing, whereby important truths about life, impossible to find out any other
way, are disclosed to human beings by a divine being or God. Mystics, in general,
claim that after years of special training it is possible to know some very important
things about life and the universe "intuitively" or in a mystical vision while in a
deep state of meditation. Mystical visions are not necessarily revelation, because
the visions not only involve personal effort and training but also do not necessarily
involve divine aid or God.

A. Science's Way of Finding the Truth

Science assumes the position of empiricism, because observational experience is
necessary, either indirectly via robot sensors and cameras or directly through
human senses to understand the physical universe. The experience must be
objective and communicable or describable in public language. Another way of
knowing often opposed to empiricism, but historically greatly influenced by the
discovery and development of mathematics, is called rationalism. The rationalist
has a great faith in the logical power of the human mind and is skeptical about the
universal validity of our observational perceptions. Some things are so clear
logically or mathematically that we just know that they are true, like the absence
of round squares on the dark side of the Moon. We know that round squares are
impossible. The rationalist believes that we can know some things about life
ahead of time, so to speak; we can know some things that no conceivable
experience will contradict.

It is difficult for many people today to imagine that the Earth is moving and not the
Sun. We do not experience ourselves moving at 1,000 miles per hour; instead we
"observe" the Sun to move. That a belief is inconsistent with our common
observational experience is not by itself a conclusive argument that it is false.
Empirical scientists do believe in the ability of the human mind to figure things out.

Any fundamental inconsistency between common sense and reason is seen as
nature's way of taunting us, of revealing one of her important secrets. The
confidence in the logical and mathematical powers of human thinking has been a
key ingredient in the development of modern science.

B. Theory Must Agree With Reality

The modern scientific method synthesizes rationalism and empiricism. The logic
of the rationalist is combined with the observational experience of the empiricist.
There is an overwhelming consensus, though, that empiricism is the main
emphasis. No matter how much logical deduction and mathematical analysis is
used, at some point the world must be checked for the confirmation of a belief.
Historically, however, spurred on by the power of mathematics and the tendency
to conclude that we know something even though complete empirical
observations are not available, rationalism has played both a constructive and
creative role in development of science. The criticism of those who are too
rationalistic and who create ivory-tower fantasies from speculative logic,
overlooks the fact that many great discoveries have been made by scientists
sitting at desks, following the elegant trails of mathematical equations. Creative
ideas are the result of a complex web of influences. The key is to have ideas with
which to make connections.

Of course, not all ideas are fruitful in making connections. Nor have great
scientists been immune from detrimental rationalistic tendencies. Tycho Brahe
was the best observational astronomer of the sixteenth century. Mathematically,
he knew that one of the implications of his extremely accurate observations of
planetary motions was that the Sun was the center of motion of all the planets,
which further implied that the universe was very large and that the stars were an
immense distance away. He could not bring himself to accept this radical
conclusion, however, and accepted instead a more traditional view for his time
because God would not be foolish to "waste" all that space!

Johannes Kepler, who used Tycho's data to finally solve the problem of planetary
motion, was motivated by his belief that the Sun was the most appropriate object
to be placed in the center of the universe because it was the material home or
manifestation of God. Galileo, in spite of his brilliant astronomical observations
and terrestrial experiments, failed to see the importance of Kepler's solution of
planetary motion because it did not involve using perfect circles for the motion of
the planet.
Science provides a way of testing and interacting with the physical universe that will better our understanding of the physical universe.

Science is a human effort and is subject to all of the best and worst of cultural biases existing at the time.

Most scientists are interested in how things work, not why things work they way they do.

Though the assumption is not necessary for science, many scientists assume that science needs to consider only the physical, concrete objects around us.

Some scientists assume that thought or consciousness is the most fundamental reality.

Philosophical (metaphysical) materialism is a sub-set of methodological materialism. Many theist scientists use the methodology of materialism to study nature but do not deny the existence of the non-material.

Possible ways of knowing: testimony, authority, revelation, mystical visions, scientific method.

Observational experience is a crucial part of scientific knowledge.

The experience must be objective and communicable in public language.

Scientific theories must logically agree with known physical truths or well-established physical laws.

No matter how much logical deduction and mathematical analysis is used, the scientific theory must be checked against the real world to confirm the theory.

However, the exploration of the implications of a logical train of thought is a vital part of the scientific process. The best ideas are those that enable us to make connections between rational theories and the physical world.

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f. Can Scientific and Scriptural Truth be Reconciled?

Truth is an increasingly complex notion. Postmodern epistemology challenges the very possibility of even obtaining truth, with some philosophers going so far as to say that there is no such thing as truth to be obtained. Very few scientists, however, accept this pessimistic view. Their experience with the regularity of the laws of nature, and the remarkable predictability of natural phenomena on the basis of these laws, has instilled in them a deep intuition that the truth is out there. A truly postmodern scientist is very hard to find.

BioLogos affirms that truth is indeed something that can be discovered, but acknowledges that human desires and limitations must always be taken into consideration when evaluating particular truth claims. BioLogos also contends that many of the recent pessimistic views of truth are contrived and inconsistent with human experience. Most human beings have enough confidence in the scientific truth to fly in planes or have surgeries.

The development and advance of science have allowed us to discover more about the universe. Such discovery results in an increasing accumulation of scientific truth. For believers, these discoveries must ultimately be compatible with the truth that is revealed in the Bible, and it is the conviction of BioLogos that this compatibility is not only desirable but also possible. The limitation is that our access to all forms of truth, including scientific and religious, is at best partial.

1. Scientific Discoveries and the Bible

The Bible is not a scientific text and should not be read that way. Scientific literature is a relatively recent and highly specialized form of communication. Reading the Bible as a literal, scientific text leads to inconsistencies between the revealed word of God and the scientifically derived history of the world. However, when scripture is read in a proper context, these inconsistencies do not come up. One, therefore, can safely accept scripture as God's revealed word, even though it does not address the specifics of many scientific questions and often refers to the natural world using the understandings of the time in which it was written.

2. Science and Religion: Answering the How and Why Questions

Science and religion are often contrasted by noting that they answer different questions, or answer the same question in different ways. Borrowing an example from the Rev. John Polkinghorne, there is more than one answer to the question of why the water in a tea kettle boils. The scientific answer might be because the burning gas heats the water. Another acceptable, though non-scientific, answer could be that the water is boiling because I want to make a cup of tea. Both of these answers are true, and both accurately describe the boiling water from
different perspectives. The kinds of answers found in the scriptures are generally nonscientific but are always true.

This is not to say the Bible lacks historical, objective or scientific truth. For example, the Bible reports the existence of the Christmas star, and science offers a possible explanation for the star's origin. The resurrection of Jesus is another example where the Bible is not limited to giving an explanation of why something happened, but it also makes a clear statement about the historical truth of what happened. Polkinghorne sums up this relationship between science and religion:

Neither [science nor religion] attains exhaustive knowledge — for the exploration of nature continually reveals new and unexpected insights, and the infinite reality of God will always exceed the grasp of finite human beings — but both believe that they achieve verisimilitude, the making of maps of aspects of reality that are adequate for some, but not every, purpose.

Science will never fully answer the why questions of religion. Moreover, a complete understanding of the mysteries of our existence will probably never be developed by the finite human mind.

Finally, one must recognize that it requires a certain level of faith to answer the scientific questions of how something happens. Answers to scientific questions assume that the laws of the universe are constant or, if recent speculations prove reliable, changing in only the most subtle of ways. This requires faith in the orderliness of nature. With or without belief in an ultimate creator, one must have faith that this universal order is real and reliable. Without such a belief, science could not give an explanation for anything.

3. Science: Intrinsic Error and Built-In Self Correction

Error is intrinsic to all human activity, including science; human technology is imperfect; and human comprehension is incomplete. All these factors contribute to a limited understanding of ultimate, absolute truth.

Nonetheless, science is self correcting. Scientific findings are constantly tested, updated and peer reviewed. Inaccuracies are corrected when new discoveries and experiments bring the truth to light more fully. This does not mean that the truth has changed. Rather the tools used to find the truth revealed their limitations due to flawed technology, inadequate understanding or misinterpretation of data. As these tools improve, science leads us closer and closer to the truth.

Building scientific theories resembles map making. A map gathers different kinds of data like longitude and latitude, elevations, waterways and climate to make a coherent representation of reality. The map is not reality itself but a model of reality. Scientific maps of reality, known as theories, need updating in response to new discoveries or improved understanding.

Selfish motivations and scientific error can also play a role in scientific discovery. Self-promoting individuals can push for outcomes that advance their reputation. A desire for particular results or an assumption about the ways things are can result in manipulation of data, whether consciously or unconsciously. Unfortunately, there have been plenty of examples of such contrived data in the history of science. One chronicle of how such distortions were perpetuated can be found in Steven Jay Gould's The Mismeasure of Man, which retells the tragic story of how 19th century science found alleged data to support prevailing prejudices about the relationship between race and intelligence.

While the scientific method standardizes and minimizes the bias and prejudice of an experimenter, random error is intrinsic to instruments of all measurements. No scientific experiment is exactly precise, and error must always be considered. The imperfections of humans and their methods means that scientific conclusions will never be perfect, but they will certainly improve with time as science advances continue to self correct. Although such critiques and qualifications of the veracity of science are important to consider, we must not let them blind us to the enormous successes of science in uncovering the patterns of nature.

4. Truth Revealed

For more on this issue, see Daniel Harrell's essay Reading Nature and Reading Scripture on how science and theology, though both interpretive and subject to error, together can lead us to truths about God.

Human limitations may prevent us from fully understanding any parts of our experience, including scripture and science. What we perceive as conflicts may actually be misunderstandings that simply require further consideration. Moreover, because God's ways are so much higher than human ways, there may be pieces of the ultimate truth that always remain a mystery and apparent contradictions that never get resolved. Professor Robert Trigg of Warwick University reflects on the idea of limited understanding:

Our reason is, like a candle, pale and flickering, compared with the light of God's wisdom. Nevertheless, it was sufficient to enable us to gain some knowledge. There was plenty of room for error, and partial knowledge, but we were, it was thought, made in the image of God, and could obtain a glimmer of understanding through science, and other operations of the human mind.
This concept is also found in the slogan of the Cambridge Platonists, a school of theologians and philosophers who were influential at the time of the founding of the Royal Society: "Reason is the candle of the Lord." To quote Francis Bacon, the father of the scientific method of induction:

To conclude, therefore, let no man upon a weak conceit of sobriety or an ill-applied moderation think or maintain that a man can search too far, or be too well studied in the book of God's word, or the book of God's works, divinity or philosophy; but rather let men endeavor an endless progress or proficiency in both; only let men beware that they apply both to charity, and not to swelling; to use, and not to ostentation; and again, that they do not unwisely mingle or confound these learning's together.

III. The Notion of Scientific Progress / Progress in Science

The wrong view of science betrays itself in the craving to be right; for it is not his possession of knowledge, of irrefutable truth, that makes the man of science, but his persistent and relentlessly critical quest for truth.

KARL POPPER: Logic of Scientific Discovery

What is required for scientific progress is mainly ordinary curiosity, ordinary awareness, ordinary learning, ordinary reasoning, and fairly ordinary communication. Of course scientists work hard to develop and use precise technical terms for many of the things they talk about, but so do lawyers and golfers and cooks.

DR. TERRY HALWES

a. General Introduction

It was a chance comment I heard someone direct at no one in particular. "Isn't it amazing," he said "that human beings could have come up with something as clever as the modern automobile." He might just as well have mentioned airplanes or computers or robots or television or any of the other modern marvels that we have all too quickly come to accept as normal. Fact is, we live in a time when we have some of the most technologically sophisticated pieces of machinery at our beck and call. It is easy to forget that these have only been part of our history for a very short time. To wonder at this is maybe not a bad idea. In fact, as I marveled at man's ingenuity in creating these things, I got to thinking about how the process actually works.

We all recognize of course that things like cars, computers, robots or television didn't just appear overnight. Nor were they created in their present form by one or two people. Most modern products are the culmination and combination of many small steps along the way. Take the automobile for instance. The very first step along that road was the invention of the wheel. No one knows who or what led to that clever bit of technology, lost as is it in the mists of time. We do know that the Romans had it and the indigenous population in North America for example, did not. Along with the two wheeled chariot, the four wheeled cart was already known in ancient times. Over time, there was a steady improvement of the cart design.

Wheels became lighter with the introduction of spokes and a hub. They became sturdier with the addition of an iron or steel ring or tire which helped to hold the wheels together as well as making them last longer. Hubs also improved as they were lubricated with ever better greases and oils and of course the wooden axles were replaced by iron and steel. By the early 17th century, personal carriages had become quite sophisticated as had the stage coach which became a venerable institution 200 years later in North America as it helped to open up the American west. By the late 1800's city streets and country lanes both in Europe as well as North America were filled with carriages heading this way and that. Most of these had one thing in common, they used horses for propulsion. Then came the next step, eliminate the horse. One of the first to attempt such a thing was a French inventor, Nicolas Joseph Cugnot who built a three-wheeled, steam-powered vehicle in 1771. This monster which only managed a little over 2 mph was easily outmaneuvered by the horse-drawn vehicles of the day. It didn't go much of anywhere.

The next attempt came a hundred years later when Amedee Bollee, also a Frenchman, built an improved 12-passenger steam car in 1873. It didn't fare much better. What was needed was a lighter, more powerful engine. Fortunately, such a thing had in fact already been invented... in 1673 by none other than Christian Huygens. Like most first attempts, this initial effort was pretty crude consisting of a piston in a cylinder along with some gunpowder. Most of the devices created by Huygens and others during this time used the resulting explosion to create a vacuum which then produced the power. This was the reverse of engines developed later in which the explosion actually created power directly. Two Englishmen, John Barber and Robert Street were the first to file patents for this bit of cleverness in the 1790's.

From there on in, development carried on apace with many inventors adding their