

## What Does Science Have to Say About The Theory of Evolution?

Doug Gillham

Revised: May, 2004

Science is, by definition, committed to the pursuit of truth. Bruce Alberts, president of the U.S. National Academy of Sciences states, "Science and lies cannot coexist." The methodology of science (testing and retesting explanations against the natural world) serves as a filter against the subjectivity that influences nearly all other fields of study. This kind of objective science is what makes technology possible, and it is the most reliable method of determining the facts.

According to the National Academy of Science's booklet on teaching science, the process of public scrutiny is an essential part of science as it works to eliminate individual bias and subjectivity. One must be able to determine whether a proposed explanation is consistent with the available evidence. Since most scientific theories attempt to explain observable and repeatable phenomena, scientists can test a theory by conducting an experiment in the same way, and get the same results, regardless of the individual's philosophies or points of view. If contradictory evidence turns up, the theory must be reevaluated or even abandoned. Otherwise, it is not science, but myth.

In addition to being committed to seeking the truth, science is committed to seeking a natural explanation for all observed phenomena. It is assumed that no divine or supernatural intervention has occurred, and that God has not revealed to us knowledge about the past. Those who attempt to bring up empirical evidence for intelligent design are considered "anti-science," not because of their methodology, but because their conclusions invoke the supernatural.

Harvard Professor Richard Lewontin is a geneticist and one of the world's leaders in promoting evolutionary theory. Science's commitment to materialism is summed up by Lewontin's commentary in the *New York Review*. (The italics were in the original) We take the side of science *in spite* of the patent absurdity of some of its constructs, *in spite* of its failure to fulfill many of its extravagant promises of health and life, *in spite* of the tolerance of the scientific community for unsubstantiated just-so stories, because we have a prior commitment, a commitment to materialism. It is not that the methods and institutions of science somehow compel us to accept a materialistic explanation of the phenomenal world, but, on the contrary, that we are forced by our *a priori* adherence to material causes to create an apparatus of investigation and a set of concepts that produce material explanations, no matter how counter-intuitive, no matter how mystifying to the uninitiated. Moreover, that materialism is an absolute, for we cannot allow a Divine Foot in the door.

The National Science Teachers Association echoes this commitment in their position statement on the teaching of evolution when they state, "...science limits itself to natural explanations and not to religious or ultimate ones".

Both commitments have been and continue to be critical to the phenomenal growth and success of science and technology that has occurred since the Enlightenment. However, a careful analysis of the textbooks used in schools across America reveals that from time to time our commitment to one position (natural explanations) occurs at the expense of the other (a pursuit of the truth). Given the overwhelming amount of evidence for the theory of evolution, why is it that nearly all biology textbooks include material that is blatantly misleading, or that has been proven false? It would seem that in our zeal to keep the creationists out of the classroom, we have allowed our pursuit of the truth to play a secondary role when determining how we teach the theory of evolution in classrooms across America. Is it possible that we adopted the position that the end justifies the means? Is it okay to teach material that has been disproven by science, as long as it keeps creationists out of the classroom?

By asking such a question I have opened myself up to the being labeled “anti-science”. However, please understand that I have no desire to limit the teaching of evolution, or to bring religion into the science classroom. I am simply asking that we step back and honestly evaluate whether our textbooks and teaching accurately represents our best understanding of the scientific evidence and whether it reflects our commitment to a pursuit of the truth. The remainder of this paper will take a look at what is written in the textbooks that are in widespread use across America, and compare that to what well-respected evolutionists are saying and writing about these lines of evidence.

According to textbooks used in high schools and universities across America, embryology supplies one of the strongest lines evidence for Darwinian evolution. In most texts this topic is discussed under the heading of “embryonic recapitulation” or “ontogeny recapitulates phylogeny”. Essentially, this teaches that an organism retraces its evolutionary history as it develops by passing through the adult forms of its ancestors. Therefore, as a human embryo develops, it will pass through a fish stage, an amphibian stage, and a reptile stage.

This theory was popularized by the German biologist, Ernst Haeckel, and became known as “biogenetic law”. However, in 1868, only months after the publication of Haeckel’s work, it was shown to be fraudulent by L. Rüttimeyer, professor of zoology and comparative anatomy at the University of Basel and William His Sr., a comparative embryologist and professor of anatomy at the University of Leipzig. They showed that Haeckel had modified his drawings to make them look more alike. Haeckel even used the same woodcuts to print embryos that were supposedly from different classes.

Nearly 100 years after Haeckel’s drawings, evolutionist George Gaylord Simpson said, “It is now firmly established that ontogeny does not repeat phylogeny” (Simpson, Introduction, 241). In 1998 Keith Thompson, a biology professor at Yale said: “Surely the biogenetic law is as dead as a doornail. It was finally exorcised from biology textbooks in the fifties. As a serious theoretical inquiry, it was extinct in the twenties.” (Thompson, American Scientific.) In 2000, Harvard paleontologist Stephen Jay Gould noted that Haeckel “exaggerated the similarities by idealizations and omissions,” and concluded that his drawings were characterized “inaccuracies and outright falsification.” (Natural History 42-49). In comparing Haeckel’s drawings and actual embryos, British embryologist Michael Richardson stated: “It looks like its turning out to be one of the most famous fakes in biology” (Science 277).

One could go into great detail on the specifics of the falsified drawings, but that goes beyond the intent of this paper. The above quotes were included to demonstrate that well respected evolutionists have known for over 140 years that Haeckel’s drawings were fakes. Nevertheless, textbooks that are used today in American schools still include Haeckel’s fraudulent drawings as evidence for evolution. Why is this? Gould places the blame on textbook writers that dumb down their content to the point that it has become inaccurate. He wrote: “We do, I think have the right, to be both astonished and ashamed by the century of mindless recycling that has led to the persistence of these drawings in a large number, if not a majority, of modern textbooks” (Natural History 42-49).

In recent years there has been an increasing amount of criticism of the inaccuracies and misrepresentations that are found in our textbooks. Some of the critics have been accused (and deservedly so) of sensationalizing these errors. The intent of this paper is not to assign blame; it is simply the pursuit of the truth. My question is why has the scientific community allowed this misinformation to be taught for so long, and why has it been so resistant to correcting this information?

To be fair, many teachers do even realize that what they are teaching about Haeckel’s embryos is not true because they were not taught the truth in high school or college. When textbook writer Douglas Futuyma was criticized for using Haeckel’s embryos in his 1998

textbook, *Evolutionary Biology*, he responded to a Kansas City internet forum by saying that he was unaware of the discrepancies between Haeckel's drawings and actual vertebrate embryos. After consulting with a developmental biologist and discovering the truth, Futuyama stated that he would take this into account in future editions of his book. It is my expectation that as more and more teachers discover the truth about Haeckel's embryos, we will see the truth being taught in more and more classrooms.

During the early 1950's, Stanley Miller, and his Ph. D. advisor Harold Urey generated tremendous excitement in the scientific community when they produced some of the building blocks of life by sending an electric spark through a mixture of gases. This mixture was composed of methane, ammonia, water vapor, and hydrogen gas, which they thought simulated the Earth's primitive atmosphere. The Miller-Urey experiment is now featured in nearly every high school and college biology textbook as evidence that science has uncovered the critical early steps in the origin of life.

However, what is the evidence that the Earth's primitive atmosphere was actually composed of hydrogen, methane, and ammonia? Back in the 1960's Abelson concluded: "there is *no* evidence for it, but much against" (Proceedings 1365-1372). In the 1970's, Sidney Fox and Klaus Dose argued that the Miller-Urey experiment started with the wrong gas mixture and that it did "not satisfactorily represent early geological reality..." They concluded: "the inference that Miller's synthesis does not have a geological relevance has become increasingly widespread" (Molecular Evolution, 76). In 1995, Jon Cohen wrote in *Science* that many researchers into the origins of life have dismissed the 1953 experiment because "the early atmosphere looked nothing like the Miller-Urey simulation" (270). So, what happens when one conducts the Miller-Urey experiment on a mixture that is more consistent with what scientists now believe to have been the make-up of the Earth's primitive atmosphere? According to Fox and Dose in 1977, no amino acids were produced by sparking such a mixture. In 1991, John Hogan wrote in *Scientific American* that an atmosphere that was composed of carbon dioxide, nitrogen, and water vapor "would not have been conducive to the synthesis of amino acids." In June 2000, Nicholas Wade, science writer for the New York Times, reported: "Everything about the origin of life on Earth is a mystery, and it seems the more that is known, the more acute the puzzles get." However, students in America are being taught a different story. A 1999 booklet published by the National Academy of Sciences explains: "Experiments conducted under conditions intended to resemble those present on primitive Earth have resulted in the production of some of the chemical components of proteins." A graduate level textbook by National Academy of Sciences President Bruce Alberts and his colleagues features the Miller-Urey apparatus and calls it "a typical experiment simulating conditions on the primitive Earth." The text goes on to explain that organic molecules "are likely to have been produced under such conditions. The best evidence for this comes from laboratory experiments" (Molecular Biology, 4). Douglas Futuyama's 1998 college textbook includes a diagram of "the apparatus Miller used to synthesize organic molecules under simulated early Earth conditions" (Evolutionary Biology, 167, 169).

The above quotes are just a sample of what is in the textbooks that are being used in our schools. The Miller-Urey experiment is of great interest and significance both from a scientific and historical perspective and, therefore, should be included in the high school and college curriculum. However, the experiment falls far short of providing an explanation for the origin of life on Earth. We are misleading the public and our students when we teach that Miller and Urey produced the building blocks of life by using a chemical mixture that simulated the Earth's primitive atmosphere, with little to no mention of the fact that most scientists now recognize that the experiment did not simulate the actual composition of the Earth's early atmosphere. If our number one goal is to pursue the truth, then this additional information needs to be included when we teach about the state of the current research into the origin of life.

As a quick aside, some are quick to point out that the origin of life and the evolution of life are two separate topics. That is true, but these topics are typically linked together when evolution is taught, and the Miller-Urey experiment is presented as critical proof that molecules to man evolution did occur. Therefore, I feel that it is relevant to include this topic in a critique of how evolution is being taught in our schools.

The field of paleontology is another area where there appears to be a discrepancy between what respected scientists are saying, and what is being taught in public schools across America. According to Darwinian theory, all living things form a continuous chain back to one of a few original forms. The assumption that life took millions of years to arrive at its present state of development has led scientists to argue that the earth should be filled with fossils that could be easily arranged into a number of sequences showing minor changes as species evolved. Darwin's theory did not simply predict that fossil transitional species would be found; it implied that a truly complete fossil record would primarily be made up of transitional species.

During Darwin's day paleontology was still a rudimentary field of study. At that time, instead of uncovering fossils of transitional forms the geologists discovered that species and groups of species appeared suddenly instead of at the end of a chain of evolutionary links. Darwin admitted "Nature may almost be said to have guarded against the frequent discovery of her transitional or linking forms." However, he argued that while the fossil problem was serious, it was not fatal to his theory. As he pointed out, "only a small portion of the surface of the earth (had) been geologically explored and no part with sufficient care." (Appleman 173) Therefore, it was widely held that in time the missing links would be found, and that the fossil record would begin to resemble what Darwin had predicted.

Since the time of Darwin, the search for intermediate species in the fossil record has developed at an ever-increasing rate. "So vast has been the expansion of paleontological activity over the past one hundred years that probably 99.9% of all paleontological work has been carried out since 1860. Only a small fraction of the hundred thousand or so fossil species known today was known to Darwin." (Denton 161)

The question, then, is whether those discoveries have resulted in a fossil record that is compatible with the theory of evolution. According to the National Academy of Sciences book *Science and Creationism*, "many of the gaps in the paleontological record have been filled by the research of paleontologists. Hundreds of thousands of fossil organisms, found in well-dated rock sequences, represent successions of forms through time and manifest many evolutionary transitions." (NAS 13) A high school biology textbook used in New York State states that "despite its incompleteness, the fossil record is still considered the strongest evidence of organic evolution." (Stoltze 579) Another textbook indicates that while the fossil record does not give a complete picture of life, "as a whole, though, the record does suggest that evolution occurs." (Oram 201)

However, according to Denton (162), the intensive research since the time of Darwin has failed to yield any of the transitional forms that Darwin proposed. Despite the tremendous increase in geological activity in every corner of the globe, and despite the discovery of many strange and hitherto unknown forms, the infinitude of connecting links has still not been discovered and the fossil record is about as discontinuous as it was when Darwin was writing the *Origin*. The intermediates have remained as elusive as ever and their absence remains, a century later, one of the most striking characteristics of the fossil record. Many other scientists have openly acknowledged this fact. David Raup, Curator of Geology at the Field Museum of Natural History in Chicago says: Well, we are now 120 years after Darwin, and knowledge of the fossil record has greatly expanded...ironically, we have even fewer examples of evolutionary transition than we had in Darwin's time. By this I mean that some of the classic cases of Darwinian change in the fossil record, such as the evolution of the horse in North America, have had to be discarded or modified as a result of more detailed information. (Davis 96) Harvard paleontologist Stephen Jay Gould states that: The extreme

rarity of transitional forms in the fossil record persists as the trade secret of paleontology. The evolutionary trees that adorn our textbooks have data only at the tips and nodes of their branches; the rest is inference, however reasonable, not the evidence of fossils (Davis 96)

In 1982, Francis Hitching wrote one of the more critical books on the evolution controversy. Though he wrote from the standpoint of a convinced evolutionist, he admits that, “the curious thing is that there is a consistency about the fossil gaps: *the fossils go missing in all of the important places*. (Hitching 19 – his italics) “Where are the fossils showing how fishes evolved into amphibians? Or how reptiles evolved into mammals? Or reptiles into birds? Missing, all missing, says Hitching.”

Instead of confirming the theory of evolution, many of the geological discoveries have actually been contrary to what was predicted by the theory. According to biologist Lynn Margulis of Boston University, “Life was very simple until 700 million years ago. Then suddenly (geologically speaking), toward the end of the Precambrian period, complex marine animals began to flourish.” (Margulis 34) During this proliferation of life, sometimes referred to as the “Cambrian explosion,” primitive forms from nearly all of the present categories of invertebrate animals appeared. Some changes have occurred, resulting in modern invertebrates that look somewhat different from those of Cambrian times, “but the picture is not one of fundamental alteration of structures. Today’s marine invertebrates can be recognized in their ancestors of 500 million years ago.” (Ibid) As Harvard paleontologist Stephen J. Gould has written: “We can tell tales of improvements for some groups, but in honest moments we must admit that the history of complex life is more a story of multifarious variation about a set of basic designs than a saga of accumulating excellence.” (Ibid)

The sudden explosion of life that was found in the invertebrate fossil record was also found in the vertebrate fossil record. The first members of each group appear abruptly, without any links to other groups by intermediate or transitional forms. A surprising amount of complexity and differentiation is also evident in these first members. Tom Kemp, curator of the University Museum at Oxford says that: “Paleontology is now looking at what it actually finds, not what it is told that it is supposed to find. As is now well known, most fossil species appear instantaneously in the record, persist for some million of years virtually unchanged, only to disappear abruptly...” (Reese)

The glaring question, then, is why is there such a discrepancy between what is being taught in the classrooms of America concerning the theory of evolution, and what so many scientists are actually saying about the theory? While we do need to carefully guard against allowing religion into the science classroom, I do not believe that this mission justifies teaching inaccurate science. In a democracy we are supposed to provide an education that teaches its citizens to think for themselves. After all, people most effectively learn the truth when they fully understand the objections to the truth. Given the number of well educated scientists who are able to honestly point to fallacies in what is being taught in our schools, should we not bring these issues out into the open to deal with rationally? Real science does not employ propaganda and legal barriers to prevent relevant questions from being asked. If we are going to be educators instead of dogmatists, we must start honestly dealing with these objections.

## REFERENCES

- Abelson, Philip H., (1966, pp.1365-1372). “Chemical Events on the Primitive Earth,” Proceedings of the National Academy of Sciences USA.
- Alberts, Bruce, (1994). Molecular Biology of the Cell 3<sup>rd</sup> Edition. New York: Garland Publishing.
- Appleman, P. (Ed.). (1970). Darwin. New York: Norton & Company.
- Cohen, Jon, (1995, 270:1925-1926). “Novel Center Seeks to Add Spark to Origins of Life,” Science.
- Davis, P., & Kenyon, C. (1993). Of Pandas and People. Richardson, TX: Foundation

for Thought and Ethics.

Denton, M. (1985). *Evolution: A Theory in Crisis*. Bethesda, MD: Adler & Adler Publishers.

Fox, Sidney W. and Dose, Klaus, (1977, pp.43, 74-76). *Molecular Evolution and the Origin of Life*, Revised Edition. New York: Marcel Dekker.

Futuyma, Douglas J., (1998). *Evolutionary Biology* 3<sup>rd</sup> Edition. Sunderland, MA: Sinauer Associates.

Gould, (March 2000, pp. 42-49). "Abscheulich! (Atrocious!)" *Natural History*.

Hitching, F. (1982) *The Neck of the Giraffe*. London: Pergamon.

Hogan, John, (February 1991, pp. 116-126). "In the Beginning...", *Scientific American*.

Lillie, Frank R., (1919). *The Development of the Chick*, 2<sup>nd</sup> Edition. New York: Henry Holt.

Margulis, L. (1984) "The Problem of the Burgess Shale." *Scientific American*.

Oram, R. (1989) *Biology: Living Systems*. Columbus, OH: Merrill Publishing Co.

Richardson, Michael K., (1997, 277:1435). "Haeckel's Embryos: Fraud Rediscovered," *Science*.

Simpson, G.G. and Beck, W.S. (1965). *An Introduction to Biology*. New York: Harcourt, Brace & World.

Stoltze, H., Schraer, W. (1995). *Biology: The Study of Life*. Needham, MA: Prentice Hall

Thompson, K. (1988, 76:273) "Ontogeny and Phylogeny Recapitulated." *American Scientist*.

Wade, Nicholas, (2000, June 13, pp. D1-D2). "Life's Origins Get Murkier and Messier," *The New York Times*.

In 1919, American embryologist Frank Lillie acknowledged that recapitulation is a logical consequence of evolution rather than an empirical inference (Lillie, *Development*, 6). Richard Dawkins states, "no qualified scientist doubts that evolution is a fact, in the ordinary accepted sense in which it is a fact that the Earth orbits the Sun. It is a fact that human beings are cousins to monkeys, kangaroos, jellyfish and bacteria. No reputable biologist doubts this. Nor do reputable theologians, from the Pope on.

However, theories that seek to explain the origins of life, and the processes responsible for the diversity in plant and animal life cannot be tested as such. However, there are major questions that are left unanswered by the theory of evolution. One of the most significant is its inability to provide an example of an evolutionary mechanism that is information enhancing. According to Richard Dawkins, one of the world's most famous Darwinists, a bacterial cell contains more information (in the form of programmed instructions) than the entire set of *Encyclopedia Britannica*. The bodies of humans and animals contain a vast number of these cells working together in marvelous harmony. If evolution is solely responsible for life, then it would stand to reason that it must be very effective in creating information. However, when evolution is defined as "information creation," we truly are dealing with nothing more than speculation. "Information-creating evolution is not empirical science at all because it has never been observed either in the wild or in the laboratory." (Johnson, *Defeating* 49-50) We are simply to accept by faith that a natural information creating mechanism does exist because the presence of information requires it, and science's commitment to excluding outside intervention demands it.

Evolutionists will often cite the mutations that make a bacterium resistant to antibiotics as proof of information enhancing evolution. However, the mutation that makes a bacterium resistant to antibiotics does so by disabling its capacity to metabolize a certain chemical. This is a net loss of information and fitness in a general sense. (Johnson, *Wedge* 46). While this is an example of evolving bacteria, it does not explain or serve as an example of how information is created or how new and complex organs develop.