An exchange on science, evolution and intelligent design

16 July 2005

On June 20, 2005 the World Socialist Web Site *published an article on the decision by the Smithsonian Institution's National Museum of Natural History to show a documentary put out by the Discovery Institute. The Discovery Institute is the country's foremost advocate of Intelligent Design, a quasi-religious view that aims to attack the theory of biological evolution. [See* "An attack on science: Smithsonian Institution to show film on Intelligent Design*"].*

In response to that article, we received a number of letters from WSWS readers, including one critical letter from reader PK, questioning the scientific validity of the theory of evolution. [See also, "Letters on Smithsonian Institution and Intelligent Design*"]. Below is PK's original letter, a reply to PK's letter from a reader DK, followed by a response from Walter Gilberti, one of the authors of the original WSWS article.*

I am definitely not a believer in intelligent design, but I take issue with the quote: "The Seattle-based Discovery Institute is the country's most prominent advocacy group for the 'theory' of Intelligent Design, a quasi-religious teaching that seeks to undermine the science of evolution." Science is based in the fundamental belief that a reaction or behavior or physical principle is observable, explainable, measurable and most of all, able to be reproduced. Evolution does not meet a single one of these requirements and so it is, and will always be, merely a theory entrenched in the same kind of dogma that surrounds religious fundamentalism. Show me a biology professor at a major university who questions Darwinism and I will show you a person on his or her way to the unemployment office.

PK

20 June 2005

The debate on the scientific validity of the theory of evolution has long since been closed. For example, the term "theory" does not mean a set of hypotheses ready to be overturned at a moment's notice. It is more like the expression "the theory of relativity," which, whatever its limits, has been demonstrated in practice to be valid.

Therefore, I think that when prominent figures in Congress advance medieval views, and when the thoughts of these "thinkers" find an echo in, of all places, the Museum that is supposed to express the scientific achievements of the nation, then views such as those expressed by the writer PK should be carefully dealt with.

PK wrote, "Science is based in the fundamental belief that a reaction or behavior or physical principle is observable, explainable, measurable and most of all, able to be reproduced. Evolution does not meet a single one of these requirements..." This is false. The principle of evolution is observable, measurable, and capable of reproduction. In fact, all of these preceded Darwin's publication of "Origin of Species": the direct enforcement of species alteration by humans had long been known. There are significant species which cannot exist without human intervention, such as the grain corn (the edible form), and, with respect to plants and animals, humans are definitely a reinforcing element of the environment!

Lest PK think that this somehow excludes from "test" all species change save those induced consciously by humans, the fossil record does not exist in a vacuum. It is strongly correlated with geological change, so that it is possible to extrapolate the principle observed, measured, and repeated by humans to a response to overwhelming changes in nature. Finally, less noticeable changes, by reasoning from the principles influencing current animal populations (and hence, measurable and, to some extent, repeatable) also enable finer elements of the operation of the same principle of natural selection.

Thus PK is left to quote, from standard anti-evolutionary texts: "Show me a biology professor at a major university who questions Darwinism and I will show you a person on his or her way to the unemployment office."

The use of the term Darwinism tells us that PK has learned from someone with their thinking stuck in the debates of the late nineteenth century. For it did not end with Darwin. The biochemical basis of mutation, uncovered fully only with the comprehension of the DNA molecule, supplemented the principle voiced by Darwin and practiced prior to Darwin by breeders, with an explanation of how species alteration can happen at all.

Therefore, the situation is quite the contrary of what PK states: it is not a dogma to accept the conclusions of the theory of evolution, particularly in its current form. It is only by employing dogma, by employing "knowledge" garnered from some immaterial, inexplicable source that one can reject these conclusions!

If representatives of the wealthy are found to expound this dogma, and if they seek to foist it on the general population then there must be an explanation. In fact, there seem to be two: first, those who will blindly believe will comprise the "social dust," as Trotsky put it, which goes into the making of a fascist movement. That is alarming enough.

At the same time, it throws up a fog around the understanding of what science is, and, unfortunately, PK, appears to be momentarily lost in this fog. As a social crisis develops, the capitalist class fears the acquisition by workers of a scientific comprehension of the world. The fight for socialism is also a fight to clear this fog away!

DK

27 June 2005

Walter Gilberti responds:

The lively and important discussion that has been generated by our article raises some fundamental questions, namely: What is science? What constitutes scientific knowledge, and how is that knowledge generated? What is a scientific theory?

PK writes that science "is based in the fundamental belief that a reaction or behavior or physical principle is observable, explainable, measurable and most of all, able to be reproduced." He continues by saying, "Evolution does not meet a single one of these requirements and so it is, and will always be, merely a theory entrenched in the same kind of dogma that surrounds religious fundamentalism."

Before dealing specifically with the question of evolution, it is necessary to consider a more basic misconception contained in reader PK's remarks, one that involves the origin of science and the nature of scientific inquiry.

It should, however, be pointed out that the late paleontologist Stephen Jay Gould often made a point of distinguishing between the *fact* of evolution—the recognition that all currently living organisms are the result of a long process of change and transformation from extinct forms—and the *theory* of evolution through natural selection as advanced by Charles Darwin.

However, Gould would be quick to point out that in science the word "theory" means something quite different than the generic use of the term. In science, an explanation about a particular set of phenomena becomes a theory only after being verified again and again through observation, the testing of hypotheses and the accumulation of overwhelming evidence.

Repeating the arguments of creationists, including the proponents of Intelligent Design, PK speaks of evolution as "merely a theory," hoping that the use of the word "theory" will somehow cast doubt on its scientific validity and place it in the same category as Intelligent Design. In fact, putting aside for now Gould's distinction, evolution is a theory, but it is a theory that is supported by a vast mountain of evidence. Intelligent Design, on the other hand, does not deserve to be described as a theory, for it does not offer a material explanation for observable phenomena, but instead resorts to mystical, unverifiable and absolutely unsupported speculation about some "intelligence" being responsible for the biological world.

What about PK's charge that evolution "cannot be reproduced" so is not a science? Here again PK holds a fundamental misconception of the nature of science and the scientific process. Too often science is presented, especially in the schools, as already proven results—the reproducible laboratory practices of people in white coats, whose results are verifiable beyond a shadow of doubt. What is usually left out is the history of the development of a scientific comprehension of natural phenomena—the trials, the observations, the questions, the theorizing, and the development of concepts—the stuff of real scientific practice.

The late evolutionary biologist, Ernst Mayr, summarized the importance of this point when he wrote: "One can take almost any advance, either in evolutionary biology or in systematics, and show that it did not depend as much on discoveries as on the introduction of new concepts.... Those are not far wrong who insist that the progress of science consists principally in the progress of scientific concepts."

Science is more than the sum total of knowledge gained through the re-creation of testable phenomena in a laboratory, even when this immediate verification illuminates our understanding of underlying principles (e.g., the behavior of gasses). Science is first and foremost a recognition that the objective world of nature is comprehensible on its own terms, without recourse to phantoms, spirits or inexplicable forces. Biological science throughout the nineteenth, and even into the twentieth centuries, has developed primarily by ridding itself of the last vestiges of vitalism—the idea that life emerged spontaneously, and inexplicably, from inorganic matter.

The emergence of science has been a protracted process that, in essential ways, records the whole history and progress of our species. From the first ideas about how fire, instead of being feared as a destructive force, could be used to our advantage, and then, made and controlled, our ancestors were unknowingly embarking on the first inquiries of a scientific nature. More recently, despite inquisitions and the persistent promoting of superstition and mysticism by the purveyors of religion, scientific inquiry from Copernicus to Einstein has overthrown the notion of the immutable universe.

The development of experimental science during the eighteenth and nineteenth centuries was certainly important, and resulted in major discoveries especially in physics and chemistry. But this in no way exhausts the essential forms of scientific practice, which also include scrupulous observation and inference based on cross-disciplinary evidence and the comparative method, leading in the end to the real work of science, the development and refinement of scientific concepts.

According to PK's logic, it is necessary to throw out entire scientific disciplines as dogma because the phenomena they describe cannot be recreated by experiments in a laboratory. Is it necessary for humans to create stars in a laboratory in order for us to develop a science of cosmology? What about the geological history of the earth? Must we reject the theory of plate tectonics because the movement of the earth's crust cannot be reproduced? Of course not. Like evolution, these historical processes take place across vast expanses of space and time, but this does not mean that there is no observable evidence for their validity. The fact that the continents have moved great distances over the course of thousands and thousands of years is confirmed by great quantities of evidence, including fossil evidence.

This brings us to the question of evolution and the monumental work of Charles Darwin.

Frankly, Darwinian evolution, or what is now known as the Synthetic Theory of Evolution owing to developments in genetics, molecular biology and paleontology, is a scientific theory whose level of veracity, to coin an oft-used basketball phrase is, "a slam dunk." The Synthetic Theory is a conceptual advance unparalleled in its ability to give a rational explanation for the phenomena of the biological world.

The notion that all currently existing organisms are the result of a long process of descent through modification is confirmed by a preponderance of evidence. As other readers have correctly pointed out, the evolution of life on this planet can be traced by the evidence in the fossil record of transitions of many types of organisms over the vastness of geological time, making evolution in that sense measurable. Moreover, Darwin's elaboration of the workings of natural selection provides a compelling explanation for the emergence and diversification of life on this planet.

Finally, evolution is occurring even as we communicate, both in nature and in the laboratory. I am not here referring to such experiments as the well-known attempt by Stanley Miller in the 1950s to recreate the conditions of the early earth's atmosphere, an experiment that resulted in the chemo-synthesis of amino acids, the building blocks of proteins. Rather, I would refer PK to the ongoing evolutionary "arms race" between medical science and microbial organisms—the continuous battle to keep pace with the emergence of pathogens resistant to antibiotics, a process driven by natural selection. Humans are, after all, part of the natural environment.

The immense quantity of evidence for Darwin's theory cannot be understated. Darwin was a brilliant observer. But he did not simply concoct his theory from his observation of Galapagos finches, as important as these were. He certainly compiled a mountain of evidence from his five-year voyage on the *Beagle*, but he was also a skilled experimenter and researcher. The vast amounts of data Darwin accumulated through a lifetime of work as a skilled and knowledgeable selective breeder, and in his exhaustive examinations into the anatomy, physiology and behavior of barnacles, a type of crustacean, enhanced the refinement of his concept of evolution through natural selection.

In addition, Darwin was greatly influenced by the work of others—geologist Charles Lyell in understanding the Earth's great antiquity, Thomas Malthus on the characteristics of populations, and Alfred Russell Wallace, whose work in the East Indies led to the elaboration of a theory of evolution similar to Darwin's. The final result, the publication of *On the Origin of Species* in 1859, was a crowning work of scientific inquiry and genius.

PK makes the assertion that Darwinism is dogmatic, in the manner of the creationism of the fundamentalists. How so? Creationism and its slightly more sophisticated variant, Intelligent Design, are in fact dogmas because they are bereft of even a shred of evidence, neither observable nor provable from any experimental or other methodological standpoint, and are laden with sophistries and outright absurdities. As is the case with the

religious opponents to evolution and the scientific world view in general, proponents of this ideology attempt to insert it into the cracks in our knowledge of the objective movement of the natural world.

Centuries ago, the work of scientists such as Redi overthrew the dogma of spontaneous generation. When Copernicus, and later Galileo and others, demonstrated that our solar system is not earth-centered, they drove the first nails into the coffin of the dogma of the immutable, unchanging universe. The work of Darwin and the subsequent discoveries in both the physical and natural sciences have moved this process toward completion. The richness of this knowledge gained over the last two centuries has rightly placed the synthetic theory of evolution as the foundation theory of the biological sciences.

PK advances a kind of a "plague on both houses" approach regarding evolution and creationism, without elaborating an alternative, but then issues the standard "persecuted minority" complaint of the fundamentalist opponents of evolution that educators who disagree with Darwinism will find their way to the "unemployment line." However, it is hardly the defenders of biological evolution who are relentlessly seeking to insinuate their ideology into the teaching of science in the public schools.

Quite the contrary! The continuing onslaught against science will have a chilling effect on both the teaching and the practice of science in the United States. The two incidents at the Smithsonian cited in the article are an indication of the relentlessness of the assault on all scientific thought by right-wing forces in and around the Bush administration. While I do not believe that Richard Sternberg should lose his job over the publication of the journal article that advances an Intelligent Design perspective, the circumstances surrounding its publication remain clouded. Sternberg's actions, however, whether conscious or merely confused, are deserving of contempt by all scrupulous scientists.

Parenthetically, I don't believe that Lehigh University professor Michael Behe, one of the chief exponents of Intelligent Design who has been repeatedly been given a forum for his views in the *New York Times*, will be losing his job any time soon.

Fraternally,

Walter Gilberti, for the WSWS