

## **The Myth of Falsifiability**

By John F. McGowan, Ph.D.

(January 7, 2000)

Recently the Kansas State Board of Education attracted considerable attention and many heated editorials when it rejected a new science education standard from the National Academy of Sciences. The Board specifically dropped proposed questions about Darwinian evolution and the Big Bang theory of the origin of the universe from state tests, arguing that Darwinian evolution and the Big Bang fail established criteria for qualifying as scientific theories. Leading scientists and many politically liberal commentators protested loudly.

What is science? Why should public schools teach Darwinian evolution and not special creation by God or the doctrines of the Hindu Vedas as science? One of the most commonly claimed attributes of a scientific theory as opposed to religion and pseudoscience is falsifiability. A scientific theory makes risky predictions that can be proven wrong. Scientific theories, however well established, are always tentative in the sense that new data can prove even the most successful theory wrong. Scientific theories are falsifiable.

Special creation by God cannot be proven wrong. An omnipotent God could create the world with river canyons giving evidence of millions of years of erosion. God could create fossils intact in the rocks at the moment of creation. God could make the ratio of radioactive isotopes in rocks consistent with an age of billions of years. There is simply no way to disprove that God created the world about 10,000 years ago as the Bible seems to claim. Thus, special creation by God is not science because it is not falsifiable.

In contrast, scientists claim that evolution and other scientific theories are falsifiable. They make risky predictions that can be proven wrong by conceivable experiments or observations. They have made risky predictions that proved correct. Falsifiability is not an abstract notion. Federal courts have accepted precisely this argument in excluding the teaching of so-called "creation science" from public schools in Arkansas.

Are scientific theories such as evolution falsifiable? Do individual scientists and science as a system actually discard theories when a prediction is disproved? In other words, does falsifiability distinguish science from non-science? Often not! A scientific theory can often be modified in such a way that the core assumptions of the theory remain true and unchallenged but some lesser, peripheral assumptions are modified to make the theory agree with seemingly contradictory evidence. Albert Einstein's initial formulation of the General Theory of Relativity indicated that the universe must be expanding, something that had not been observed at the time. Accordingly he added a cosmological constant to the theory making agreement exact. Subsequently, apparent expansion of the universe was discovered and the cosmological constant was quietly dropped. The

discovery of the expansion and evidence for the Big Bang is now taken as a confirmation of General Relativity. One can easily see that if the expansion had not been discovered, the cosmological constant would have been retained and again the theory would have been confirmed by observations.

The modification of major scientific theories to make them agree with observations continues today. Darwinian evolution predicted the discovery of large numbers of intermediate forms, missing links, in the fossil record, none of which had been found in Darwin's time. With a few exceptions the fossil record continues to show long periods of stasis, the sudden disappearance, and the sudden appearance of species. The missing links remain missing. Most scientists have not discarded evolution. Indeed the prominent popularizer of evolution Stephen Jay Gould proposed punctuated equilibrium in which evolution conveniently occurs very quickly in small isolated populations that rarely leave a record as fossils to reconcile evolution with the fossil record. The absence of evidence for evolution becomes evidence of evolution. The core assumption that complex organisms are the product of random variation and natural selection is preserved by altering less important details of the theory.

Falsifiability is a myth. In the messy real world of observations and experiments, theories often must be modified to accommodate new evidence. Since any theory can be modified with ad hoc assumptions to agree with contradictory observations or experiments, no theory is strictly falsifiable whether it is called science or not. *Criteria for judging a modification to a theory unreasonable and therefore rejecting the modification must be added for falsifiability to have any real meaning.*

Falsifiability is often a double standard. Politically unpopular, unorthodox, or simply new theories are demanded to be strictly falsifiable, a condition they can never meet. Accepted scientific theories are asserted to be falsifiable even though they have been and are frequently modified to explain contradictory data. The need for criteria to reject a modification to a theory as unreasonable is either denied or not mentioned, creating an illusion of certainty. These rejection criteria are not mentioned because they are often matters of fallible personal judgement and opinion. The doctrine of falsifiability offers only a mirage of certainty in distinguishing science from non-science.

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