So You Say You Don't Want Evolution

Apparently some folks in Kansas are unclear on the concept of theory. They think that calling evolution "just a theory" denigrates the idea and that being unproven is an unnatural state for a theory. That attitude betrays a basic misunderstanding of experimental reasoning, and points to the fundamental gulf between the two camps. The furor may be the be best thing to happen to science education in a long time, provided it focuses instruction on the basic tenets that underly the scientific method.

First of all, if you believe that any of the descriptions of the physical world taught in schools are either more than approximations or to be taken as absolute truths, you or your science instructors have fallen asleep on the job. That's simply not the way the physical sciences work. Physical scientists are always working with the current best explanation. If an explanation is proposed that is a better predictor than the current one or that provides a simpler explanation of equal accuracy, scientists change course.

Perhaps the problem is a confusion between theories and theorems. A theorem is a statement that can be absolutely proven with respect to certain axioms or basic assumptions. If you believe that the Bible is literal truth, then the assertion that evolution doesn't occur is a theorem. With respect to the belief system represented by the literal text of the Bible, there is a mechanism for creation of species and it ain't Darwin's.

Another common example are Euclid's geometric theorems. They are all true, but current evidence suggests that under certain conditions they may not be a very accurate model of the universe we live in. They're still absolutely true with respect to Euclid's axioms, though.

The axioms of science lead to fewer truths than either the Bible or Euclid's *Elements*. Basically the axioms are that the best explanation of observable phenomena and predictor of future occurrences is the one that deserves one's provisional assent. Most scientists believe that a tie between theories goes to the simpler. Because theories are rated on their ability to explain and predict physical occurrences, a premium is placed on objective observation. Observations of a phenomenon are usually not accepted until they have been reproduced many places. The theory that currently is accepted by the majority of scientists is usually the one presented in schools, but often not the only possible explanation.

Under science's axioms, no theory is given special treatment. If a new explanation for people sticking to the Earth is put forth that is either simpler or a better predictor than the the theory of gravity, reasonable scientists will move it into the front of the pack. But no matter how much supporting evidence a theory has behind it, it never becomes a theorem. Theories cannot be proven.

A person who lives by theorems changes observation to be consistent with theorems; a person who lives by theory changes theory to fit observation. As Orwell will tell you, there are plenty of both in the world.

In my opinion, the discussion that the Kansas hullabaloo should be prompting isn't whether Kansas's standardized tests should cover evolution - that's really a political issue. Kansans are deliberately putting a hole in their children's education, which I think is foolish, but, practically, not knowing the arguments in favor of evolution will affect most children as much as my dearth of opera knowledge has affected me.

The issue that's being avoided is whether the decision will hinder the teaching of the scientific method and experimental reasoning. It's my hope that it will have the opposite effect. Because instructors have been forced to emphasize that evolution is "just a theory," maybe more of them will spend time pointing out exactly what that means. Personally, I think that categorizing descriptions of the world based on their simplicity and predictive power is the most fruitful way to characterize them, and that the never-ending horse race between theories promotes a deeper understanding of the world than memorizing absolute truths. But whether I can convince you of that or not, a discussion of what constitutes grounds for belief is a fruitful way to spend classroom time.

It's gotta be better than discussing opera.