Don't Teach the Controversy!

The argument is disarming. Living organisms are often remarkably adapted for a particular purpose–so much so that it seems they must have been created by a purposeful designer. And at first blush that theory appears much more plausible than the proposition that the exquisite complexity of nature arose entirely by unplanned natural causes. Why then do we refuse to allow the creationist model to be presented and discussed in science class as an alternative to the theory of evolution? Isn't science supposed to be open to opposing opinions? In refusing to allow creationism into the classroom are we not repeating the error of those who refused to look through Galileo's telescope for fear that they might discover something new? Why can't we, in the words of President Bush, "teach the controversy"?

The argument is a hardy perennial, and to judge from the comments provoked by a recent Education Week article ("Efforts to Improve Evolution Teaching Bearing Fruit," December 21, 2010), it appeals to at least some readers of this publication. The article in question described a project supported by the National Science Foundation that is teaching "evolution readiness" to fourth graders by having them run virtual experiments using computer models that evolve by natural selection. As the director of that project, I am grateful for this opportunity to explain why I feel so strongly that creationism has no place in science class.

That opinion is based on two others:

1. Creationism in all its forms, including "Intelligent Design," is not science.
2. It is vitally important not to teach non-science as though it were science.

The physicist Wolfgang Pauli, known equally for his Exclusion Principle and his biting wit, once said of a proposed theory, "That idea is not even wrong." The identity of the research paper that incurred Pauli's displeasure is lost to history, but his quip is an apt description of the assertion that the adaptations of organisms can be "explained" (or rather "explained away") by positing that an unknown and unknowable entity designed them that way. Such a theory can never be proved wrong. It will never even be revised because, in contrast to evolution, which has undergone continual revision since Darwin's day, it makes no testable predictions other than the trivial one that living creatures should look as though they were designed.

Creationism is not science because it introduces causes outside of nature in order to explain observations of nature. Theories like that do not foster inquiry; rather, they close off discussion. Discoveries of apparently designed organisms are taken as "proof" of the theory; observations of suboptimal design are taken as indications that the external designer, though "intelligent" is not "perfect." When all the fuss is over, nothing is ever discovered, or can ever be discovered, that sheds new light, connects previously disconnected data, offers new insights, or generates new knowledge.

That's why creationism shouldn't be taught as science: not because it's wrong–it isn't even wrong!–but because it isn't science. (Though I would certainly support (and would love to teach) a class that contrasted creationism and science in order to help students appreciate the difference.)

So why is it so important that non-science not be taught as science? Because they are radically different, and the difference has critical implications.

Scientific theories make testable predictions about the world, predictions that often extend well beyond anything the inventor of the theory had in mind. For instance, Darwin had never heard of the DNA molecule so he couldn't possibly have anticipated its role in evolution. But a century later, when the central function of DNA as the carrier of genetic information was discovered, the theory of evolution predicted that the DNA of different species ought to differ in very specific ways. Here's why:

Darwin postulated that species evolve because those individuals that carry traits that make them more likely to survive (e.g., a warm coat on a polar bear) are likely to have more offspring than their unfortunate brethren (the polar bears with scraggly coats). So the better-equipped organisms are more likely to pass on their beneficial traits to future generations, and after a while the species as a whole changes. But the process is very gradual: it takes many generations for significant changes to take place, and the longer you wait the more change you can expect to see. And those changes take place at the molecular level, too.

So, for instance, two species (for example, dogs and wolves) that diverged from a common ancestor a few million years ago—relatively recently in evolutionary terms—ought to have very similar DNA. However, more distantly related species (for example, giraffes and skunks, or snakes and butterflies) are predicted to be less similar at the molecular level because they diverged from a common ancestral species hundreds of millions of years ago. In other words, the more recently any two species diverged from their ancestral species, the more similar their DNA ought to be. This is a powerful prediction! It opens up a whole new line of evidence, entirely unknown to Darwin and his contemporaries, that enables one to construct a "family tree" comprising all living things on earth. And unless this new evolutionary tree parallels pretty closely the one we have already crafted by analyzing fossils, the entire theory of evolution might come crashing down!

The DNA evidence is accumulating rapidly and evolution still stands tall, but the story does not end there. It turns out that subtle differences in the DNA of humans from different subpopulations may have profound implications for combating disease. The details are still being worked out, but the basis of the technique is pure evolution. People who have lived for many generations in parts of the world where a certain disease is endemic have been subjected to intense selective pressure, which has had an effect on their genetic makeup. In effect, these individuals have evolved to acquire a resistance to the disease. By studying their DNA we are learning how these people fight off the disease; some day we may put that knowledge to work for the rest of us.

It's an exciting approach to solving an important problem—and it would never have occurred to anyone if we had just given up and said, "Living creatures look designed so there must be a Designer. We don't know anything about this Designer, and there's no way to find out anything, so let's just leave it at that."

The goal of science is to discover things, to create new knowledge, to understand new phenomena. Non-science does none of these things. Confronted by something it does not understand, non-science introduces something else it doesn't understand, solely for the purpose of explaining the first thing. Not only does this lead to an infinite regress (who designed the Designer?), even worse it eliminates any opportunity to discover natural explanations for natural phenomena. And that makes a huge difference.

We live in an age when the extraordinary success of science has brought with it unprecedented problems that can only be addressed with the help of science. For that reason alone, to allow non-science to be taught as though it were science would be a mistake of literally global dimensions.

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