



## "Should We Really Teach *All* Theories of Origins in Science Class?"

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Recently, the New Mexico State Board of Education removed all mention of evolution from draft state science standards, and instead mandated that public school science students "*perform a critical scientific analysis of theories of biological origin.*" However, the vast majority of scientists and professional scientific organizations have affirmed that evolution *is* the only scientific, evidence-supported theory for the diversity of life.

The various "theories" besides evolution have not been spelled out in detail, but have been interpreted as ranging from those entirely consistent with biological evolution (such as "punctuated equilibrium") to those that are simply a euphemism for Biblical creationism (such as "intelligent design.") Creationists have rushed to support the new content standards, which they see as declaring open season on evolution, and also as permitting "intelligent design."

Of course, it is imperative to present science truthfully in our public schools - and that requires that science content is, in fact, comprehensive, honest and accurate. The problem with the popular "evidences against evolution," however, is that they are almost invariably based on misrepresentation, misinformation, or flawed logic.

Clearly, we must not censor valid scientific information in school. But that is quite different from presenting false or flawed information as fact. Here are just a few examples of some popular, but flawed "evidences against evolution."

**"There are no transitional forms."**

Creationists often quote scientists, especially Stephen Jay Gould, as declaring the absence of transitional forms, or "missing links." But Gould once said only that *certain* transitional types are *rare*; he has on numerous occasions noted that there are abundant

fossils that represent undeniable transitional forms.

There are excellent fossils linking fish to amphibians, reptiles to mammals, reptiles to birds, and so forth. In just the past decade there have been spectacular finds of fossil whales with various stages of legs, which they inherited from a land-walking ancestor. In fact, the only people denying the existence of transitional forms are the creationists themselves. Is it fair to encourage teachers to tell our students that there are *no* transitional species, when that contention is completely without support in mainstream science?

### **"The 2nd Law of Thermodynamics Prohibits Evolution."**

The Second Law of Thermodynamics is often misstated and misinterpreted by creationists and anti-evolutionists, who claim that it makes evolution impossible. But the Second Law only prohibits evolution of order from disorder in *closed systems*. The Earth is definitely *not* a closed system (as anyone who has felt the heat of a New Mexico summer sun knows). Thus, evolution on Earth does not violate the 2nd Law.

Consider an *open* system consisting of a plastic tray with several compartments, each filled with liquid water. When this "system" is placed inside a freezer, the water freezes, with a reduction of entropy and an *increase* in order. If it were impossible to develop order in open systems, then ice cubes as we know them could not exist.

### **"Evolution Means Life Arose Completely By Random Chance."**

Creationists often say that evolution is based completely on *chance*, and then ridicule the gradual development of complex life forms by comparing this process to events such as a 747 jet suddenly forming itself out of a junkyard. While chance occurrences such as mutations or asteroid impacts do play a part in evolution, they are simply not the whole story - *natural selection, reproduction* and *heredity* have very important roles. Life is *not* completely random - after all, rabbits give birth to baby rabbits, not to baby ducks. And natural selection is the opposite of random chance - *reducing* genetic variations, not increasing them.

### **"Isn't It Fair To Teach Both Sides?"**

If any scientist stumbled on irrefutable evidence that disproved evolution, that person would publish immediately, in great hopes of becoming the next Darwin or Einstein. But the fact is that no such revelations have been forthcoming. Evolution and creationism *are not opposite sides of the same coin*. Evolution is evidence-based science, while creationism is faith-based religion. It is inappropriate to teach creationism in science class, just as it is to teach evolutionary biology at a church sermon.

Anti-evolutionists often contend that *evolution* is a religion. But religion depends on revelation and divine authority as the sources of truth, while science depends on testing explanations against real, physical *evidence*. There is no room in science for magic,

miracles or divine revelation. Mathematicians are not allowed to include miracles in their proofs of theorems. And the rules of science do not permit biologists to solve puzzles regarding the development of life by simply resorting to a supernatural "Creator" or "Intelligent Designer."

Several religious organizations have made statements supporting the secular scientific study of origins. However, if some people feel that science is irreconcilable with their own religion, they have every right to choose their faith over science. They can send their children to parochial schools, or even home-school their children. But they must not be allowed to redefine science for the rest of us, or to teach their religion to our public school-children. Teaching *about* creationism in a comparative religions class is fine - but teaching creationism as science is *not*.

Public school students should be capable of demonstrating grade-appropriate knowledge of the major findings of science, whether or not they privately agree with them. Without learning the basics of biology and geology, our children will be severely handicapped when they attempt to compete in college or in industry.

The bottom line is that it's not fair to immerse public school students in the emotional, heated debate tactics of creationism, and it's not fair to most religions to have the beliefs of one particular sect promoted as "scientifically valid." The creationists should attempt to prove their case to scientists - not to innocent children.

Please contact the Coalition for Excellence in Science Education for more information, or to join this non-partisan group of scientists, parents, and clergy.