



CSSP ISSUE: TEACHING EVOLUTION IN SCIENCE CLASSES

CSSP Position: Evolution, a major unifying concept of science for which an abundance of strong evidence exists, should be taught in science classes. Creationism or “intelligent design” is not based on testable, verifiable data, should not be part of a science curriculum.

Background: Evolution refers to measurable patterns of change in the natural world over time. These can be extensive periods of time, as in the formation and evolution of galaxies in the universe over billions of years, or short periods of time, as in the evolution of a bacterial population over days or weeks. Biological evolution is an explanation for the diversity of organisms and how they have changed since the origin of life on Earth. It concludes that all species have evolved with modification from common ancestors, and that a major cause of such change is differential survival and reproduction (natural selection). As are all scientific constructs, evolution is empirically testable. As a concept, evolution is important to many areas of science, and in biology it provides a powerful unifying framework for interpretation of otherwise disparate observations.

How Science Works: Science is a way of understanding the natural world based on verifiable and verified knowledge. A cornerstone of the advancement of science is the scientific testing of hypotheses to offer explanations of how natural phenomena came to be, or how natural processes work. Scientific ideas or explanations must be testable and capable of being shown to be wrong. A scientist formulates deductions or predictions that follow if the hypothesis or idea is true, conducts tests, examine the data to see if the predictions are borne out, and then either rejects or tentatively accepts the hypothesis. Hypotheses gain increasing acceptance as more experimental outcomes concur with predictions and are always open to reconsideration. Conversely, if the data reject the hypothesis, that hypothesis is discarded and replaced by another testable idea. Scientists use the term “theory” in a particular way to refer to an interrelated set of hypotheses that have been rigorously tested. In this important sense, a scientific theory is very different from the non-scientific use of the word theory to mean little more than a guess or an opinion. Other broadly accepted scientific theories include gravitation, plate tectonics, atoms, relativity, the germ theory of disease, and quantum theory.

Relationship of Evolution to Science: The idea that evolution can explain the diversity of past and present life is subject to test by framing deductions such as: If species evolved, then we would expect to see that species that lived in the past are different from those alive today, and that the farther back in time one goes, the more different are the fossils from contemporary species. Are these specific predictions (among many others) borne out or not? Scientists can look at the physical evidence and can, for example, determine the age of rocks by chemical and physical analyses of radioactive elements. These analyses show that Earth is billions of years old, which allows ample time for changes in species as seen in the fossil record. There are many lines of evidence for evolution all pointing to the same conclusion. Though the various lines vary in their strength, and some – such as the fossil record – may be incomplete, in aggregate they are compelling. Thus, evolution rises to the level of a scientific theory because it is well tested and explains many related phenomena.

Intelligent Design and Why It is Not Scientific: Intelligent design and similar concepts such as “creation science” are based on the creative actions of a supernatural intelligent designer. Such claims cannot be considered scientific because they are not testable or falsifiable: any result of every possible test is compatible with the actions of a supernatural creator. Accordingly, presenting intelligent design as a valid science is not appropriate in science courses.

CSSP Conclusion: In science education, students need to understand the many kinds of questions that science can answer and the ways that science can expand our knowledge. Part of this process is to show students the difference between data and conclusions derived from the methods of science and other claims not so based. There is no place for creation science, intelligent design or other supernaturally-based concepts within science curricula. The evolution of the universe, the planet Earth, and living things, should be taught because they are overwhelmingly supported by evidence: Evolution has become a cornerstone of modern science. Although there sometimes is pressure from the public to teach alleged “evidence against evolution”, this alleged “evidence” has not been recognized by the scientific community and should not be included in the curriculum.

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