

Science Standards Evolve

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There is good news and bad news regarding evolution in state science education standards. As detailed in the article by Louise Mead and Anton Mates (2009) in this issue, the good news is that, as of spring 2009, more state standards include evolution, and that the treatment of evolution is generally more competent in the current generation of standards. The bad news is that, in several states, creationist language has been inserted—either intentionally or inadvertently. Although science education standards are not necessarily closely followed by teachers, the inclusion of evolution is critical: unless evolution is in a state's standards, it will not be in the state tests, and if it is not in the tests, it will not be taught. In addition, the inclusion of evolution in a state's science education standards provides a "shield" for teachers to place between themselves and those opposing the teaching of evolution—which may include parents, students, and unfortunately, even administrators.

Discipline-specific standards in mathematics, history, science, and other fields grew out of education reform movements of the 1980s. Model documents such as *Benchmarks for Science Literacy* (American Association for the Advancement of Science 1993), *National Science Education Standards* (NSES; National Research Council 1996), and *Scope, Sequence and Coordination of Secondary School Science* (National Science Teachers Association 1992) were produced in the hope of influencing the content and pedagogy of science education standards. Evolution has a prominent place in all of these documents, reflecting the consensus of both scientists and teachers that evolution is a concept central to science literacy.

But education is highly decentralized in the United States, with over 15,000 local school districts, each with a degree of autonomy over curriculum and instruction. So even though the National Research Council entitled its model document NSES, because of local control of education, there are no true national standards. Model documents are only advisory; each state develops its own standards, although most have been influenced by NSES, devised as it was by the nation's most prestigious scientific institution, and by the other model documents.

Because evolution is socially controversial, though not scientifically controversial, and given the politicized nature of education in the United States, it was inevitable that there would be attempts to treat evolution specially—and invidiously—in the science standards of many states. Between 2000 and 2008, the National Center for Science Education recorded controversies over evolution in science education standards in 18 states. The true total may be higher, since in some states, the writing and approval of state standards is conducted with little publicity. Whatever the actual number, it is clear that when state science standards are being written or revised, evolution is often a contentious issue.

In 2000, physicist Lawrence S. Lerner reviewed the coverage of evolution in state science standards, finding that it was satisfactory to excellent in 31 states but unsatisfactory, useless, or even "disgraceful" in 19 states—more than a third. (Lerner was including the District of Columbia, but not Iowa, which then lacked state science standards.) Repeating Lerner's study nine years later, Louise Mead and Anton Mates (2009) found cause for optimism, although there is still room for improvement. The unsatisfactory or worse category now includes only 11 states, with some states that had received D or F grades from Lerner now receiving A or B grades after revising

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their standards in the interim. An unfortunate exception is Texas, whose grade plummeted from a C to an F after its state board of education inserted creationist wording into the standards during the 2009 revision. Texas, as it happens, is the poster child for the newest creationist strategy of undermining the treatment of evolution in state science standards.

Initially, creationists tried to eliminate evolution from state science standards, but this approach was unsuccessful save in a handful of states. The prominent place of evolution in the NSES, *Benchmarks*, and other national model documents discouraged this approach, and the teachers and scientists on the standards writing committees, aided by citizens concerned about science education, fiercely resisted these campaigns. Failing to eliminate evolution, the first fallback position was then to try to get creationism into science education standards. These efforts were also defeated, although not without great effort on the part of scientists, teachers, parents, and other interested citizens.

Over the last few years, the creationist strategy most frequently encountered when science education standards are revised is the disparagement of evolution as unsupported or weak science. This largely reflects the creationist

shift, following legal defeats such as the 1982 case *McLean v. Arkansas* and the 2005 *Kitzmiller v. Dover*, from arguing for creationism on its merits to arguing against evolution while remaining silent about the supposed alternatives (Branch and Scott 2009). Commonly, as in Texas, the attack on evolution is couched in terms of “critical thinking”—as if having students question the validity of a major scientific concept with which they are largely unfamiliar will somehow improve both their science literacy and their critical thinking skills.

The controversy surrounding the adoption of the Texas science education standards clearly shows that the intent of such revisions adopted by the board is to encourage the presentation of creationist arguments such as gaps in the fossil record, the young age of the earth, the alleged “irreducible complexity” of highly intricate processes or structures, and similar canards (Newton 2009; Rosenau 2009). These creationist motifs are presented in the Texas standards as “alternatives” to the standard science presented in the textbooks. Many people perusing the Texas standards, unaware of the recent evolution of the creationist movement, might not recognize the creeping creationism that teachers in that state will be facing. If textbook publishers acquiesce to the desires of creationists on the

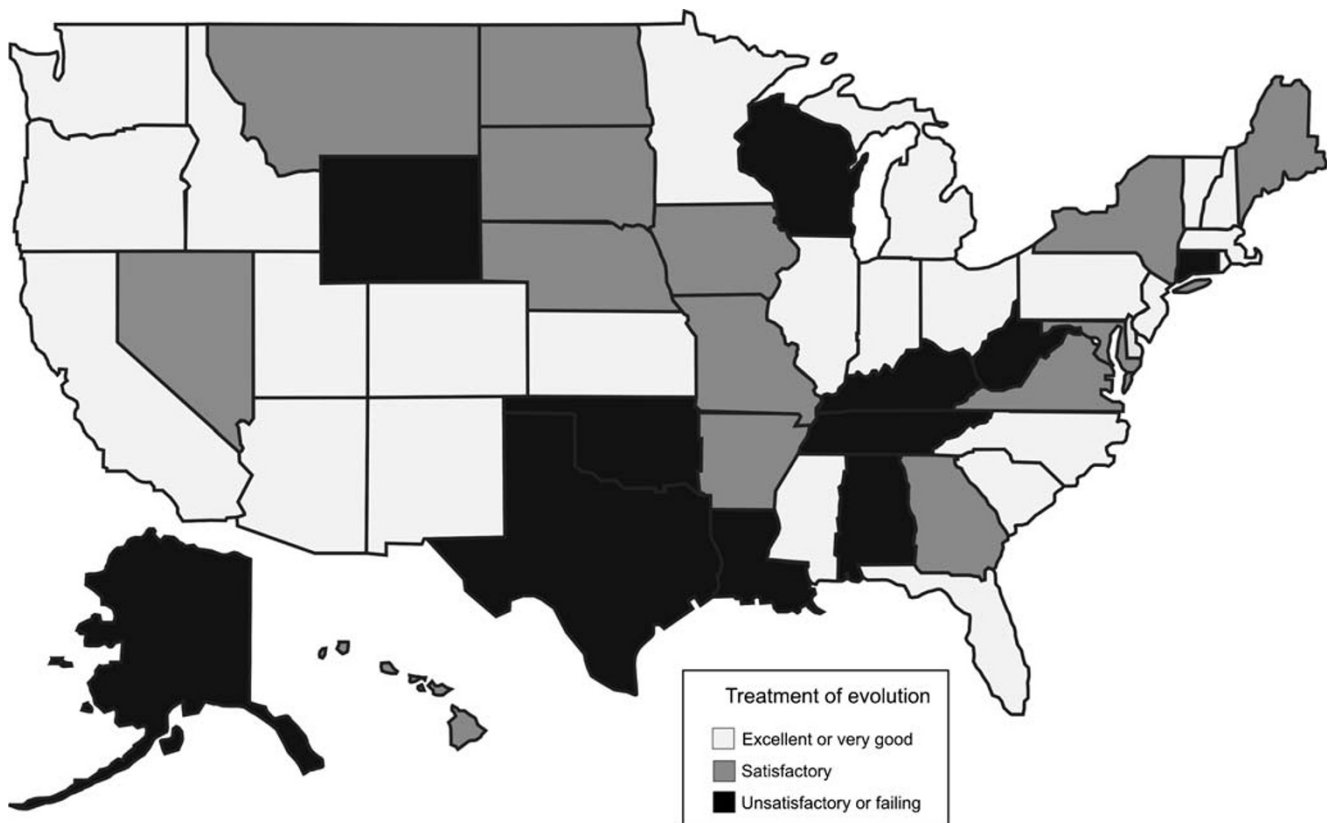


Fig. 1 The treatment of evolution in state science standards as of 2009. There has been an improvement since Lerner 2000, but there is much room for improvement

Texas state board of education to include such arguments in the next generation of biology and earth science textbooks, teachers all over the country will be facing the same challenges.

On the basis of Mead and Mates's results, there is reason to be pleased by the progress over the last ten years in the inclusion of evolution in state science education standards. That the treatment of evolution is inadequate in almost one in five states still suggests that there is considerable room for improvement, but we should be optimistic that teachers, scientists, and others who care about science education will continue—as science standards continue to be periodically revised—to work for the appropriate inclusion of evolution in state science education standards.

Please read the accompanying article by Mead and Mates in this issue of *Evolution: Education and Outreach!* There is a wealth of information about the history and role of standards in science education, a sketch of why state science standards matter to the teaching of evolution, and grades for the coverage of evolution in each state's science standards, with details for a handful of states. (How is *your* state faring?) Reproduced here is the central graphic of their discussion, which I hope will whet your appetite for the full

article—it will not substitute for a careful reading of the article itself. And be sure to consider their final recommendations about how you can make a difference in improving the treatment of evolution in state science standards. Figure 1

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