

Analysis and Recommendations Regarding Implementation of TEKS(3)(A) in Texas Biology Textbooks for the Texas State Board of Education

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I am Dr. Robert Pennock, Associate Professor of Science and Technology Studies at Michigan State University, where I also serve on faculty of the Ecology, Evolutionary Biology and Behavior program. I also speak as a member of the Education Committee of the international Society for the Study of Evolution (SSE). My area of expertise is the nature of scientific evidence, especially as this relates to evolutionary biology. Although I no longer live in Texas, my nephew currently attends Westwood High School.

I testified in 1997 at the hearings on the TEKS standards on behalf of the UT chapter of Sigma Xi, The Scientific Research Society. At that time I spoke in favor of the proposal because of the way it began to incorporate scientific ways of thinking into the curriculum, and for the way it recommended putting specific facts in the context of their explanatory frameworks, such as evolutionary theory. It now appears that the solid foundation of that document is being undermined by religious special-interest groups, especially one with which I am very familiar.

For the past dozen years I have been researching the activities of the neocreationist movement, and have published two books [1,2] and numerous academic articles showing the many flaws in the arguments of so-called “intelligent design theorists” such as those affiliated with the Discovery Institute and its Center for Science and Culture. Because they have no positive evidence for their view, intelligent design (ID) advocates rely upon purely negative argumentation, claiming that there are insurmountable weaknesses with evolution. That is how they are trying to insert their views here, by improperly appropriating the language of TEKS (3)(A).

The Discovery Institute is not a scientific organization and has no scientific credibility. Its governing goal from an internal mission statement is “To replace materialistic explanations with the theistic understanding that nature and human beings are created by God.” [See 2 for a detailed discussion.] Their main target is evolution, but their attempt to replace it with the alternative view that life was created by “intelligent design” has been a total failure scientifically. They talk big but have produced no results. Texans know what to say about this. *When it comes to science, the intelligent design movement is all hat and no cattle.*

For a review article I published in this month’s issue of *Annual Review of Genetics and Human Genetics* [3], I surveyed published scientific and scholarly reviews of the ID theorists most significant works, including Jonathan Wells’ book *Icons of Evolution*,

upon which the current criticisms of the proposed biology textbooks are based. That response has been universally negative. I will just quote a few representative conclusions that relate to the purported “weaknesses” of evolution that ID proponents are citing.

Peppered moth researcher Bruce Grant minced no words, writing of Wells claims in *Icons* and elsewhere: "He distorts the picture, but unfortunately he is probably pretty convincing to people who really don't know the primary literature in this field. He uses two tactics. One is the selective omission of relevant work. The other is to scramble together separate points so doubts about one carry over to the other. Basically, he is dishonest." ... Rudolph Raff reviews Wells' accusations of scientific fraud and censorship and concludes that they are "built on a shaky scaffolding of special pleading and deceptive use of quotations." Jerry Coyne says Wells uses "selective omission to distort a body of literature he pretends to review." [3]

Some of the criticisms Wells and the Discovery Institute have made are just silly, such as the complaint about “staged” moth photos. I think of trying to take pictures of my 1 1/2 year old daughter. Like others of her species, she moves about a lot, coming to rest briefly on in one favorite spot and then another. I do have blurry candid shots, but to get a good, clear picture I have to strap her into her highchair or have Mom hold her tightly in her lap. It’s rather like gluing down a moth. These *posed*— not “faked”—pictures are often the best way to document a significant feature. The fact is that moths do rest on tree trunks, branches, and elsewhere, and the classic photographs properly document the salient fact that differential coloration of moths and background that are significant for camouflage and thus an advantage for survival.

After Wells first published his misleading and spurious criticisms about purported weaknesses in the evidence for evolution, the SSE Education Committee began to put together a white paper that discussed the many misrepresentations in his book. However, the reviews and criticisms of Wells’ claims from experts were so devastating that the biologist who was leading our project decided that it was not needed. Wells’ claims were so thoroughly refuted and discredited that it seemed that no one could take them seriously. There is no reason to start doing so now; the complaints are without scientific or educational merit.

So far, ID has also been a failure politically. Advocates of intelligent design on the Kansas Board of Education had a short-lived success in 1999, but sensible citizens voted out anti-evolutionist Board members in the next election whose decision was then reversed. Bills introduced in Michigan in 2001 to downplay evolution and to require teaching the “intelligent design of a creator” as an alternative did not make it out of committee. (They were reintroduced a couple of months ago). Intense ID lobbying at the Ohio Board of Education in 2001 and 2002 failed and ID was explicitly rejected. Language that ID lobbyists attempted to insert into the No Child Left Behind bill was briefly supported but then left in a committee report. Hopefully, Texans will not be the first to be taken for a ride by the Discovery Institute.

According to TEKS (3)(A), texts need to present scientific information that will prepare students to discuss the strengths and weaknesses of scientific explanations. It is clear that the specific “weaknesses” being pushed upon the Board do not qualify as sound scientific information. It is also pedagogically irresponsible to present this issue as though all scientific theories are equivalent in their evidential strengths and weaknesses; texts must accurately represent the scientific state of the art. The textbooks fall short in this regard (and would be worse still if the DI recommendations were to be followed). They need to accurately represent the fact that evolution is one of the most strongly supported of all scientific discoveries.

Students cannot analyze, review and critique the strengths and weaknesses of scientific findings, if they are misled about the scientific assessment of the evidence, as achieved by long accumulation of observation and experiment and vetted in the peer-reviewed journals. To *properly* fulfill the mandate of TEKS 3(A), the discussions of evolution ought to be *supplemented* to accurately reflect its scientific centrality and its abundant empirical support.

For instance, sections that discuss evolution should emphasize how it is one of the strongest of all scientific discoveries. By way of comparison, it could be noted that we have even more and even better evidence for Darwin’s discovery than we do for the discovery that the earth goes around the sun. Scientists regularly observe the evolutionary mechanism at work, both indirectly and directly. They perform experiments that test and refine evolutionary hypotheses. The current proposed textbooks need to do better at conveying this. They are also weak in failing to convey the strength of evolutionary theory as it is applied for practical and economic benefit in agriculture, medicine, engineering and industry.

Even the presentation of the historical “icons” can be improved to more accurately portray how these early experiments led to strengthened evidence. Let me just give a couple of examples of how publishers could improve their coverage to better satisfy TEKS(3)(A).

When the peppered moth case is covered, the great strength of the evidential support for its central findings about natural selection should especially be emphasized. If weaknesses in Kettlewell’s original experimental design are mentioned, textbooks should then explain that subsequent moth studies corrected these (citing Mejerus’ or others’ research, for instance), and confirmed the core results in different parts of the world. Texts should note that industrial melanism is one example of an early experiment and should explain that numerous other studies with different organisms and different environments have tested and confirmed the various elements of the evolutionary mechanism.

Textbooks that mention the Miller-Urey experiment should not only note its historical importance as a spring-board for origin-of-life experimental research but should say something about how its central finding, namely that organic molecules can spontaneously form from inorganic molecules, has been subsequently reconfirmed in a variety

of different initial conditions, giving references to a sample of journal articles from origin-of-life researchers.

The same sorts of improvements should be made with regard to whatever other lines of evidence are covered. Here and elsewhere, students need to get a sense that in describing a historically important case or even a contemporary one, the text is simply providing an example from the vast peer-reviewed literature.

In my 1997 TEKS testimony I wrote: “Given evolution’s central explanatory role in biology, it probably should receive even greater emphasis in the proposed curriculum, but I am happy to support the proposal as a step in the right direction.” Having reviewed all the proposed textbooks, I judge that further steps are needed. In most of the textbooks, evolution is still ghettoized in a chapter or two. Some anti-evolutionists claim that omitting weaknesses in the icons of evolution amounts to censorship, but the opposite is true. The relentless attack upon evolution by religious special-interest groups continues to have a chilling effect upon sound scientific pedagogy. Ideally, evolution should be a unifying theme that appears systematically throughout every section of these biology texts, since it is the fundamental explanatory framework in biology. Publishers need to take further steps to properly display the unique strength and importance of evolution. They certainly should not misinform and mislead students about the scientific view by inserting bogus claims about weaknesses that do not exist.

Your decisions will not just affect my Texas nephew’s education. Since Texas textbook adoptions indirectly affect what publishers offer in other states, your decisions here may also affect my daughter’s education in Michigan. It is not just the eyes of Texas that are upon you. The eyes of the nation are watching as well. I hope they will not see you bamboozled by the spurious arguments of the Discovery Institute and its lobbyists. I trust they will see you take a stand here for sound science education.

REFERENCES

[1] Pennock, Robert T. *Tower of Babel: The Evidence Against the New Creationism* (MIT Press, 1999).

[2] Pennock, Robert T. *Intelligent Design Creationism and Its Critics: Philosophical, Theological and Scientific Perspectives* (MIT Press, 2001)

[3] Pennock, Robert T. "Creationism and Intelligent Design" *Annual Review of Genomics and Human Genetics*. (Vol. 4: 143-163, Sept. 2003)