

December 18, 2007

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Dear Mr. Scott,

Thank you for your reply to the biologists' letter concerning the TEA's "neutrality" regarding evolution and intelligent design. I have forwarded your response to my colleagues. I believe I can speak for most of the faculty who signed the letter (now over 150), when I say that the work that you and the TEA do to strengthen K-12 education in Texas is appreciated. It is precisely because we recognize your efforts that we felt it would be helpful to contact you with our concerns as professional educators and researchers in the biological sciences.

I and the other signers of the biologists' letter recognize the distinction between the policy-setting role of the Board of Education and the implementation duties of the TEA. As public bodies, both must be responsive to the public's concerns. However, it is also essential that these public bodies stand for the highest educational standards that reflect the current state of scientific knowledge. Listening to the public is essential, but the public is not always fully informed or correct when it comes to technical matters like the content of a science curriculum.

There is an old joke about the tendency of elected bodies such as school boards to want to compromise: If group A thinks that  $2 + 2$  is 4, and group B thinks  $2 + 2$  is 6, the school board will declare that  $2 + 2$  is 5. (My favorite historical example is the Indiana State Legislature's House Bill No. 246, which passed 67 to 0 and redefined the mathematical constant pi to be 3.2, rather than 3.14159..., at the urging of a doctor and amateur mathematician Dr. Edwin Goodwin.) There are times when  $2 + 2$  simply has to equal 4, and pi does not equal 3.2 no matter what the House Bill said.

Likewise, evolution has overwhelming empirical support, while there is zero original empirical research supporting intelligent design, and no credible evidence against evolution.

You write "that anything said will be scrutinized and may be interpreted as representing a position of the agency or State Board of Education." The Board's position on science education should be to provide the best and most accurate science possible, regardless of the political consequences. There are times when public bodies need to lead, and this is one of them. Speaking on behalf of my colleagues, I urge both the Board and the TEA to exercise such leadership by issuing statements that unambiguously support the teaching of evolution and omission of intelligent design in public classrooms. The full weight of scientific evidence would be on your side. The scientific community is agreed that evolution should not only be taught, but taught in a straightforward manner, unqualified by alleged "weaknesses" that are invariably based on faulty logic or misrepresentations of available data.

This is emphatically not an attempt to suppress contrary viewpoints. Rather, it is a professional judgment that the claims of “weaknesses” in evolution are based on shoddy scholarship. We wish to assure you that not a single so-called weakness promoted by anti-evolutionists has passed scientific muster. For example, the Discovery Institute’s recent publication *Exploring Evolution: The Arguments for and against Neo-Darwinism*, which was written to facilitate classroom discussions of “weaknesses,” is demonstrably full of factual errors and logical fallacies. We would be more than happy to help you understand the flaws in any of the “weakness” arguments that you or members of the Board are uncertain about.

This is not to say that there are no controversies in evolution. But the genuine controversies concern esoteric points about *how* evolution works, not *whether* it works. Such debates are a normal component of active research in any scientific field, and do not signify the existence of “weaknesses”. For example, there is currently a vigorous debate over whether coding or regulatory genetic changes contribute more to evolution. Coding changes alter the structure of proteins and their functions; regulatory changes alter when and where a given protein is produced. Clear instances of both types of evolutionary change have been documented, but their relative importance is a subject of active research. Personally, I would love to see these kinds of debates taught in science classes, but they do not represent “weaknesses” in evolution as a whole. The difficulty is that understanding these topics requires a substantial level of background knowledge. In the case I just outlined, students must understand how coding and regulatory genes work, but gene regulation is not covered until university-level biology courses, so students are not equipped to investigate this topic until late in their undergraduate careers. The same pedagogical problem arises for many of the supposed “weaknesses” of evolution described in creationist sources like *Explore Evolution*

In your response to the biologists’ letter, you mentioned Process Skill 3A, which taken on its face, is innocuous and seems to be admirable pedagogy: “The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to: (A) analyze, review, and critique scientific explanations including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information.” You correctly identified 3A as being applied to all science standards from 3rd grade through the discipline-related standards for high school. From its ubiquity across the curriculum, we assume that the purpose of 3A is to encourage students to exercise scientific reasoning, which is quite appropriate. However, you probably recall that in 2003, during the textbook adoption hearings, the evolution-related standards were the only standards to which 3A directly was applied, in an effort to weaken the coverage of evolution in the books. An attempt to force textbook publishers to rewrite their textbooks to include non-existent “weaknesses” almost succeeded. This would have resulted in students in Texas and nationally being miseducated about evolution. Upon entry to university science classes, they would have to unlearn the spurious “weaknesses” they had been taught in high school, which is profoundly unfair to them.

We look forward to working with the SBoE to rephrase 3A to encourage critical thinking in all the sciences, without providing a backdoor for scientifically unsound “weaknesses” that are currently being promoted by the Discovery Institute and other creationist organizations. Dropping the “strengths and weaknesses” language from the TEKS is an important first step. I and others

of my colleagues are willing to assist the TEA or the TEKS reviewing committees in this effort. Having science standards that accurately reflect the scientific community's consensus is essential to the successful education of Texas students.

In conclusion, biology faculty around the state are deeply concerned that next year Texas will be a battleground where creationists (including advocates of intelligent design and "weaknesses" of evolution) try to water down evolution education. This would harm public understanding of biology (already poor), weaken the quality of university-bound biology students, and undermine Texas's ability to compete in tomorrow's biotechnology-driven economy. I hope that as the TEKS revisions move forward, both the TEA and the Board adopt firm stances in support of improving evolution education. I also hope that the the Board consults more extensively with Ph.D. biologists among the highly qualified research and teaching faculty at universities around Texas. Finally, on behalf of all my co-signers, I extend an invitation to you to discuss details of evolutionary biology with faculty from any of the universities in Texas. There is a vast reserve of knowledge about science and in particular about evolution in this state that is at your disposal as you and the the Board work to understand the current state of knowledge on this topic. Please avail yourself of this resource, and take a firm stand in support of increased quality of evolution education in Texas.

Sincerely,

Dr. Daniel Bolnick, University of Texas at Austin

P.S. You commented on the disclaimer in our original letter, that the letter reflected our own professional opinions. I should point out that this was only added because the ouster of Ms. Comer created an atmosphere of intimidation. A number of faculty expressed concern over possible retribution from their state employers for signing the letter. Some chose not to sign for fear of their jobs, others signed on the condition that the disclaimer be added.