

Brian Alters, Ph.D.  
Expert Witness Report

March 30, 2005

Kitzmiller, et al. v. Dover Area School District, et al., CA-0404-2688 (M.D.PA.)  
First Amendment challenge to the Dover Area School District's policy to promote  
Intelligent Design as an alternative to evolution in the biology curriculum.

I am an Associate Professor of Education and Sir William Dawson Scholar at McGill University in Montréal, and also hold appointments in the Redpath Natural History Museum, Faculty of Science, McGill University; and in the Harvard College Observatory (specifically in the Science Education Department, Harvard-Smithsonian Center for Astrophysics), Harvard University. I am the founder and Director of the Evolution Education Research Centre, and I have held appointments as Associate and as Visiting Scholar/Affiliate at the Philosophy of Education Research Center, Harvard University.

As my Curriculum Vitae describes in greater detail, I have been a keynote, plenary, and featured speaker at various science education meetings, such as the National Association of Biology Teachers (NABT) National Convention and the National Science Teachers Association (NSTA) National Convention. In addition, I have given invited talks at the annual national meeting of the Society for the Study of Evolution (and joint meeting with the American Society of Naturalists and the Society of Systematic Biologists), the NABT (joint symposium with the American Institute of Biological Sciences and the Biological Sciences Curriculum Study), the American Society for Microbiology, and many universities, colleges, and museums.

I have been a contracted evaluator for various significantly-funded U.S. National Science Foundation (NSF) science education programs/projects, supervised practice

teaching of science teachers at both McGill and Harvard, and published five books in the last five years on science education, including one for science teachers about the teaching of evolution and how to properly address questions relating to creationism, including intelligent design. I have been a member of the education committee of the Society for the Study of Evolution for over six years. I have also collaborated with science educators and scientists at various universities, and am currently an Advisor on a \$2.9 million NSF science education grant project at Harvard.

I have taught science education classes to over 1,000 pre-service science teachers at McGill and Harvard universities, and have presented to thousands of in-service science teachers. In addition to teaching graduate courses in science education at McGill and Harvard, I have given invited class lectures to Harvard pre-service science teachers for six consecutive years. In 2003, I was awarded McGill University's highest honor for teaching excellence.

**OPINION:** It is my professional opinion that the Dover Area School District's policy on biology instruction, as passed in October 2004 and implemented in January 2005 (hereafter referred to as simply Dover policy), is detrimental to student scientific literacy. The effect of the Dover policy will be to: (1) require science teachers to use poor pedagogy, (2) require science teachers to disregard findings of the scientific community, (3) require science teachers to disregard recommendations of their national professional science teacher associations, (4) contradict teachers' professional preparation and professional development, and (5) improperly prepare students for postsecondary science education at secular schools.

(1)

The Dover policy will require science teachers to use poor pedagogy. Science teachers are taught to diagnose students' misconceptions and then facilitate activities so students may construct appropriate understanding. For over a decade, explanations (for teaching purposes) about how students learn science have been reported by the leading science and science education associations. For example, the NSTA and the National Academy of Sciences (NAS) report that students bring misconceptions to the classroom about both scientific phenomena and scientific processes, and teachers need to engage these misconceptions to increase understanding of science. One well accepted practice in the science education community is that science teachers should do their best to not engender needless misconceptions.

The Dover policy requires students to be "made aware" of intelligent design as a scientifically appropriate alternative to evolution. However, no leading science education associations or scientific associations agree that intelligent design is a scientifically appropriate alternative to evolution. All leading science education associations and scientific associations do agree that learning about evolution is one of the most important concepts, if not the most important concept, in a biology course, and that students cannot attain a well-rounded background in science without learning evolution. Due to the misinformation students learn as a result of the Dover policy, the students may incorrectly think that the scientific community and the science education community have conflicting views on the matter. Treating intelligent design as a scientifically acceptable alternative to evolution, and suggesting that "gaps/problems" exist that cause question in the scientific consensus of evolution's occurrence, unnecessarily engenders

student misconceptions and thus is poor science education practice. Moreover, the Dover policy engenders the misconception that there is a so-called scientific “controversy” in which the scientific community is seriously debating the validity of evolution. Another such misconception is that supernatural causes can be considered within the scientific community as appropriate scientific causes for biological phenomena. Rather than being instructionally advantageous, the Dover policy advances these incorrect characterizations. Furthermore, singling out evolution as the example to teach about weakness in scientific evidence is poor pedagogy for numerous reasons. For example, even for students who have no anti-evolution sentiments, singling out evolution for an example to teach about evidence weakness still sends an inaccurate signal that evolution is an inferior science.

No state or national science education standards, benchmarks, or frameworks support the teaching of: (a) intelligent design, (b) the existence of so-called gaps/problems that supposedly cause question in the scientific consensus of evolution’s occurrence, or (c) a so-called scientific “controversy” which has the scientific community seriously debating the validity of the occurrence of evolution. Overall, the educational methodological approach of the Dover policy is not accepted by the relevant science education communities.

Furthermore, if, as I have been advised by the plaintiffs’ lawyers, the Dover teachers are instructed by school administration not to answer student queries about intelligent design (after the students have been made aware of intelligent design in science class by being read the four-paragraph statement), then such action is pedagogically irresponsible. No public school science teacher should be put in the inappropriate position where students are made aware, in-class, of a “scientifically valid

theory” that supposedly counters the very cornerstone of biology, and then be forced to remain silent after students ask about this apparently important scientific theory. I am unaware of this illogical practice existing anywhere else in U.S. public school science education.

(2)

The Dover policy requires science teachers to disregard findings of the scientific community by requiring them to make students aware of intelligent design as being an alternative scientific theory to evolution. Science teachers practice science teaching; they do not have the role of unilaterally deciding what theories are scientifically valid. Most school teachers are not “scientists” with research labs, and do not publish in peer-reviewed scientific publications, present science at scientific research conferences, receive scientific research funding, etc. Teachers look to mainline scientific associations for appropriate information about the validity of scientific concepts. This is particularly true when teachers hear of an “alternative scientific” theory to something as important as a major unifying concept in science such as evolution. What teachers find when they examine the position of the mainline scientific communities is that there is currently no scientific alternative theory to biological evolution and that intelligent design is scientifically invalid. For example, the American Association for the Advancement of Science has a Board Resolution stating that “the lack of scientific warrant for so-called ‘intelligent design theory’ makes it improper to include as a part of science education.” Furthermore, in a recent NAS publication for science teachers, the current academy president states that “Opponents of evolution assert that the scientific justification for

evolution is lacking, when in fact the occurrence of evolution is supported by overwhelming evidence. Legislators and school boards insert wording into laws, lesson plans, and textbooks mandating that evolution be taught as a controversial explanation of life's history, though no such characterization is scientifically warranted.”

The findings of the scientific community are clear to science teachers. Therefore, a major flaw in the Dover policy is that it requires high school science teachers to disregard the findings of the scientific community.

**(3)**

Likewise, the Dover policy requires science teachers to disregard recommendations of their national professional science teacher associations. For example, the NABT's official statement on teaching evolution declares that “Explanations or ways of knowing that invoke non-naturalistic or supernatural events or beings, whether called ‘creation science,’ ‘scientific creationism,’ ‘intelligent design theory,’ ‘young earth theory,’ or similar designations, are outside the realm of science and not part of a valid science curriculum.” In addition, the NSTA's official position statement on teaching evolution declares that “Policy makers and administrators should not mandate policies requiring the teaching of ‘creation science’ or related concepts, such as so-called ‘intelligent design,’ ‘abrupt appearance,’ and ‘arguments against evolution.’ Administrators also should support teachers against pressure to promote nonscientific views or to diminish or eliminate the study of evolution.”

Similarly, the use of a textbook, such as *Of Pandas and People* in the science classroom as a reference book goes against the national teaching associations’

recommendations for criteria in textbook use. For example, the official NSTA Background Paper on The Use and Adoption of Textbooks in Science Teaching encourages “criteria that promote the use of textbooks that are . . . accurate in science content.” As reported previously, the major scientific organizations do not consider intelligent design to be valid science. Therefore, any textbook that presents intelligent design as a valid science is a textbook not meeting the encouraged textbook criteria of the NSTA.

**(4)**

The Dover policy contradicts teachers’ professional preparation and professional development. For example, the Association for Science Teacher Education (ASTE) Position Statement for Science Teacher Preparation and Career-long Development states that “Science Teacher Preparation and Professional Development programs are essential elements in the success of contemporary science education. . . . These programs should focus on practices that are grounded in the research and professional literature on science learning and teaching.” I am unaware of any such secular practices existing for intelligent design. Furthermore, the 2005 ASTE annual conference program lists over 200 sessions. There are sessions about teaching evolution in section categories titled “Paper, research study,” “Roundtable Discussion,” “Experimental Session,” and “Paper presentation – Position Paper.” Nowhere is intelligent design listed as being presented in any manner; yet the Dover policy places intelligent design as an alternative to the cornerstone of biology. Likewise at the latest NABT Annual Convention, there was a major joint evolution education symposium of the American Institute of Biological

Sciences and the Biological Sciences Curriculum Study with over 25 scientists and science educators presenting to an audience of science teachers. Numerous presentations mentioned why intelligent design is not appropriate, while none mentioned that intelligent design is appropriate.

In addition, the NSTA Position Statement on Science Teacher Preparation states “To prepare teachers to teach science effectively, NSTA strongly recommends that all science teacher preparation programs have a curriculum that includes substantive experiences that will enable prospective teachers to . . . understand how to find and use credible information . . . on the curriculum.” Intelligent design is not credible according to the leading scientific associations. Therefore, the Dover policy is contrary to science teachers’ professional preparation and professional development.

**(5)**

The Dover policy will result in improperly preparing students for postsecondary science education at secular schools. While there is a plethora of undergraduate, masters, and doctorate degree programs based on evolutionary biology, I am unaware of any degree programs based on intelligent design at secular colleges or universities. I am also unaware of any secular college biology textbooks advocating intelligent design, state or federal funding of scientific research awarded for so-called intelligent design research, and presentations of intelligent design at mainline scientific conferences. High school students who are “made aware” that intelligent design is a scientific alternative to evolution will find this to be erroneous when they continue their education in college and in science careers. In addition, the Dover policy of making students aware of



“gaps/problems” that supposedly have lessened the confirmed scientific status of evolution’s occurrence engenders an incorrect perception. I am unaware of any secular college biology programs, courses, textbooks, conferences advocating that gaps/problems have lessened the scientific consensus of evolution’s occurrence. Engendering student expectation of postsecondary science courses involving intelligent design, and gaps/problems that supposedly have lessened the confirmed scientific status of evolution’s occurrence, is faulty educational preparation.

In summary, the Dover policy is not consistent with the state of the practice of public school high school science education in the U.S., and is detrimental to teaching and learning science.

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