Brian Alters, Ph.D.
Expert Witness Report

November 11, 2006

Selman, et al. v. Cobb County School District and Cobb County Board of Education
Dover Area School District, et al., Civ.A-File No. 1:02-CV-2325-CC

I am the Tomlinson Chair in Science Education (an $8 million endowed chair and project) and Sir William Dawson Scholar at McGill University in Montréal. I hold appointments in the Redpath Natural History Museum, Faculty of Science, and the Faculty of Education, 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. I am also the Director of the Tomlinson Project in University-Level Science Education at McGill 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 National Institutes of

Health, the American Society for Microbiology, the Royal Society of Canada, 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. One of those books was written to science teachers and discussed 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. In addition, I am currently on the Board of Directors of the National Center for Science Education.

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. In 2005 I was an Expert Witness in the U.S. federal trial concerning the public school teaching of intelligent design and evolution, Kitzmiller v. Dover Area School District.

OPINION:

I have reviewed the sticker addressing the subject of evolution that the Cobb County School District affixed to the front cover of the biology text used by students in the School District. It is my professional opinion that a policy of the fixing the sticker to the textbook (hereafter referred to as the "Sticker Policy"), is detrimental to student scientific literacy. The effect of the Sticker Policy will be to: (1) engender student misconceptions about evolution and the nature of science, (2) require science teachers to use poor pedagogy, (3) require science teachers to disregard findings of the scientific community, (4) require science teachers to disregard recommendations of their national professional science teacher associations, (5) contradict teachers' professional preparation and professional development, and (6) improperly prepare students for postsecondary science education at secular schools.

(1)

The Sticker Policy requires students to use a textbook with an abnormally overt message instructing students that evolution is contained in their textbook and "is a theory, not fact," and that "this material should be approached with an open mind, studied carefully, and critically considered." The sticker sentences engender the conceptions in students that (1) the occurrence of evolution is not scientifically factual, (2) scientific theories cannot be scientifically factual, (3) evolutionary science is a less credible science than other sciences in the textbook, and (4) evolutionary science in particular should be approached more critically than other subjects in the textbook.

The Sticker Policy encourages students to consider these conceptions as scientifically appropriate. However, no leading science education associations or scientific associations hold that these conceptions are scientifically appropriate.

All leading science education associations and scientific associations do hold that 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 Sticker Policy, the students may incorrectly think that the scientific community and the science education community have conflicting views on these matters. Juxtaposing the language of "theory, not a fact" with language encouraging focused critical thinking on evolutionary science engenders the incorrect notion that problems exist that cause question in the scientific consensus of evolution's occurrence. Moreover, the Sticker Policy engenders the misconception that evolutionary science is a less credible science than other sciences in the textbook. Another misconception engendered by the Sticker Policy is that scientific theories cannot be scientifically factual. Rather than being instructionally advantageous, the Sticker Policy advances these incorrect characterizations. Furthermore, singling out evolution as the example to encourage open-mindedness, careful study, and critical consideration sends an inaccurate signal that evolution is an inferior science -- even to students who have no anti-evolution sentiments. It unnecessarily engenders student misconceptions and thus is poor science education practice.

(2)

The Sticker Policy will require science teachers to use poor pedagogy. 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. Science teachers are taught to diagnose students' misconceptions and then facilitate activities so students may construct appropriate understanding. One well accepted practice in the science education community is that science teachers should do their best to not engender needless misconceptions. The Sticker Policy requires teachers to use a student textbook (part of pedagogy) with an overt message that facilitates student misconceptions.

No state or national science education standards, benchmarks, frameworks, or recommended pedagogy support the teaching of: (a) evolutionary science being less credible than other biological concepts in textbooks, (b) the occurrence of evolution as not scientifically factual, thus causing question in the scientific consensus of evolution's occurrence (c) scientific theories' incapability of being scientifically factual, or (d) evolutionary science being more critically approached than other textbook subjects. Overall, the pedagogical approach of the Sticker Policy is not supported by the relevant science education communities (e.g., NSTA, NABT).

(3)

The Sticker Policy requires science teachers to disregard findings of the scientific community by requiring them to use a textbook disclaimer that prominently and overtly states "evolution is a theory, not a fact." Yet, the position of the mainline scientific community is that the occurrence of evolution is factual.

Science teachers look to mainline scientific associations for appropriate information about the validity of scientific concepts. They practice science teaching; they do not have the role of unilaterally deciding what concepts 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 rely on mainline scientific associations most heavily when they hear of a significant “criticism” 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 on evolution is that there is currently no scientific alternative theory to biological evolution and that the occurrence of evolution is considered scientifically factual. For example, the American Association for the Advancement of Science states that “the phenomenon of gravity, like evolution, is an accepted fact**.”** The NAS has published that "the contention that evolution should be taught as 'theory, not fact' confuses the common use of these words with the scientific use.” 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 Sticker Policy is that it requires high school science teachers to disregard the findings of the scientific community, or the teachers must spend their valuable classroom time attempting to correct the textbook sticker's misinformation.

(4)

Likewise, the Sticker Policy requires science teachers to disregard recommendations of their national professional science teacher associations. For example, the NSTA's official position statement on teaching evolution declares that "Administrators also should support teachers against pressure to promote nonscientific views or to diminish or eliminate the study of evolution." The likely effect of the sticker is a diminished proper study and understanding of the nature of evolutionary science.

Similarly, the incorporation of an evolutionary science disclaimer as part of the science textbook 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 the occurrence of evolution to be nonfactual or singled out for special critical treatment. Therefore, any textbook that

incorporates the sticker as part of a valid science is a textbook not meeting the encouraged textbook criteria of the NSTA.

(5)

The Sticker 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 that promote the singling out of evolution for treatment as in the Sticker Policy. Furthermore, at last year's NABT Annual Convention (2005), there was a major joint evolution education symposium of the American Institute of Biological Sciences and the Biological Sciences Curriculum Study that included information on why evolution is an extremely strong science. Not one of the 25 scientists and science educators who spoke proposed that the occurrence of evolution is nonfactual or should be singled out for critical treatment by students or instructors.

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." Presenting evolution as an inferior science

is not credible according to the leading scientific associations. Therefore, the Sticker Policy is contrary to science teachers' professional preparation and professional development.

(6)

The Sticker Policy will result in improperly preparing students for postsecondary science education at secular schools. While there is a plethora of biology undergraduate, masters, and doctorate degree programs based on the factual occurrence of evolution, I am unaware of any degree programs based on doubts about the occurrence of evolution at secular colleges or universities. I am also unaware of any secular college biology textbooks that advocate that the occurrence of evolution is nonfactual or should be singled out for special criticism. Furthermore, I am neither aware of any state or federal funding of scientific research awarded to determine if evolution occurred nor of presentations of data against the occurrence of evolution at mainline scientific conferences. Thus, high school students who are "made aware" that the occurrence of evolution is scientifically nonfactual will find this notion to be erroneous when they continue their education in college and in science careers.

In addition, the Sticker Policy of singling out evolution for critical treatment engenders an incorrect perception about the confirmed scientific status of evolution's occurrence. I am unaware of any secular college biology programs, courses, textbooks, or conferences that advocate a diminished view of the scientific consensus of evolution's occurrence. Engendering students' expectations that postsecondary science courses will involve such conception is faulty educational preparation.

In summary, the Sticker 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.

Brian Alters (November 11, 2006)