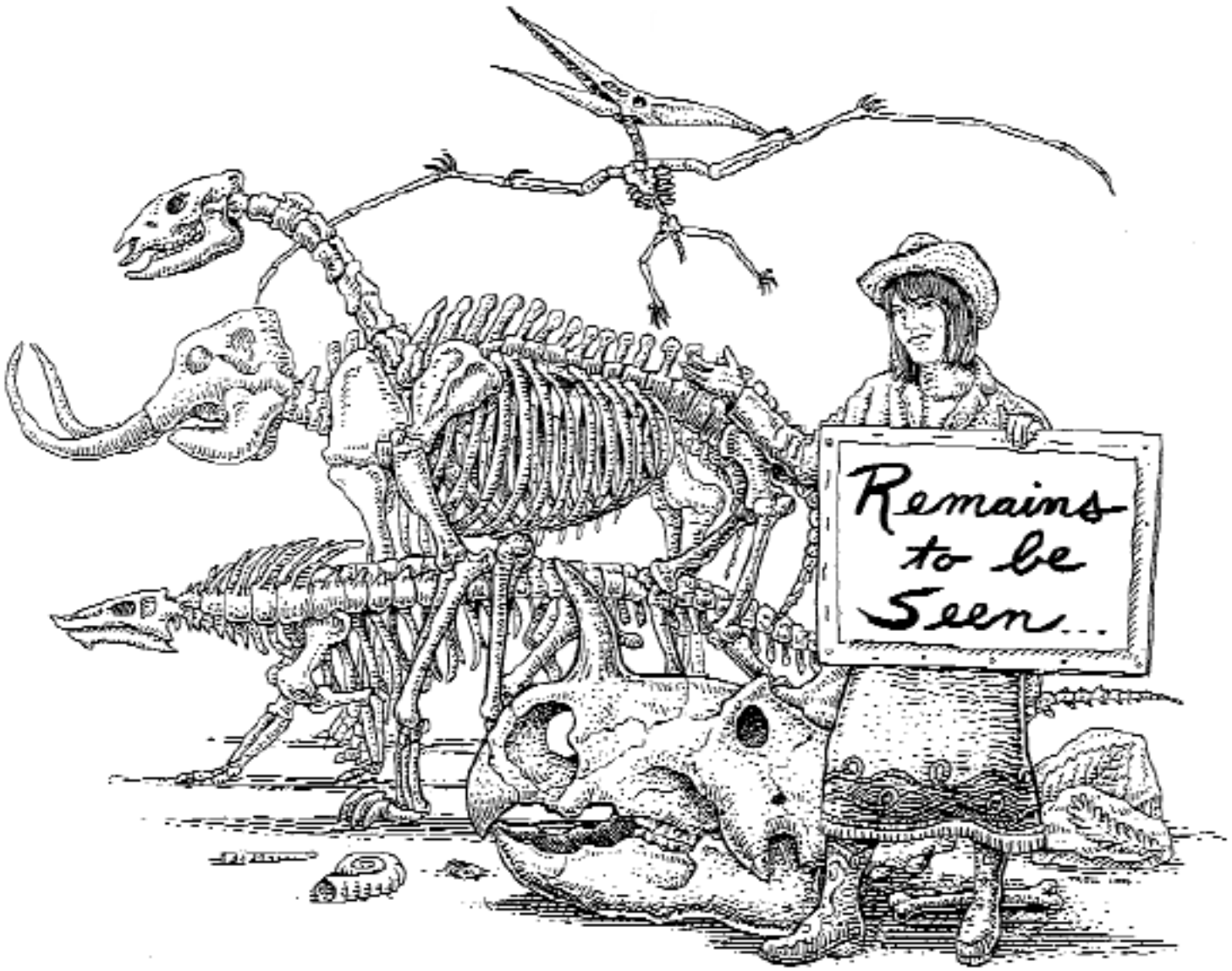
REPORTS OF THE NATIONAL CENTER FOR SCIENCE EDUCATION

DEFENDING THE TEACHING OF EVOLUTION IN THE PUBLIC SCHOOLS

Volume 28, Number 2 **MAR-APR, 2008**

CONTINUES *NCSE REPORTS & CREATION/EVOLUTION*



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NATIONAL CENTER FOR SCIENCE EDUCATION
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VOLUME 28, NR 2, MAR-APR 2008
ISSN 1064-2358

Cover: "Remains to be Seen" by Ray Troll

FROM THE EDITOR

Some people never learn — or so it seems. There is probably no state that has had more anti-evolution policies, programs, and curricula struck down by the courts as Louisiana — often at considerable cost to its citizens. So it may seem surprising (to some) that the state's legislature is at it again. The new bill is one of a handful of "academic freedom" bills that supposedly protect students from getting a "one-sided" view in certain aspects of the curriculum; those sciences that have come to conclusions that the legislators do not like. As we go to press, this bill appears headed for a floor vote, and, if passed, it is very likely that Governor Bobby Jindal will sign it.

The question about scientific knowledge that citizens may not like is also the subject of a feature essay by Eugenie C Scott and Glenn Branch. The strategy of demanding that students be allowed to "opt out" of the "evolution part" of science courses is modeled on statutes that allow parents to opt their children out of sex education, animal dissection, and a few other offerings because of their religious or ethical beliefs. The attempts to apply these exemptions to evolution are often based on an unique interpretation — some would say *mis*interpretation — of these statutes and of US Department of Education Policies dealing with data collection for federally funded programs. The difference, of course, is that these other exemptions deal with discrete units that can be isolated from other parts of the curriculum; by contrast, if biology is taught properly, evolution is a fundamental component of *every* aspect of the course. There is no way to omit the evolution section and have a coherent curriculum in the life sciences.

IN THE NEWS

Several other states have introduced "academic freedom" bills based on the same model as that in Louisiana. None of those bills seems headed for a floor vote, and all are expected to die with the current legislative session.

Joshua Rosenau gives us the final word on the new science education standards in Florida. The final outcome was to strengthen evolution education in the science curriculum, including using the word "evolution" for the first time (prior to this review, "evolution" appeared only in the anthropology standards in the section on the history of our species). However, an official in the state's department of education inappropriately used her position to urge fellow Christians to oppose the standards. She was reprimanded, but not dismissed (unlike Chris Comer in Texas).

Speaking of Texas, the Texas Higher Education Coordinating Board denied accreditation to the Institute for Creation Research's master's degree program in science education. The THECB determined that the ICR did not demonstrate that the proposed program met "acceptable standards of science and science education" and that the degree awarded would inaccurately label the academic content and the nature of the program. The ICR plans to appeal the decision.

EX LIBRIS

Our book reviewers have been so busy that we are offering an extra serving of reviews to help us catch up with them. NCSE Supporter G Brent Dalrymple reviews a translation of Pascal Richet's *A Natural History of Time*. The book gets to the heart of the matter in a format very amenable to non-scientist readers.

Michael R Dietrich reviews NCSE Supporter Francisco Ayala's recent book, *Darwin's Gift to Science and Religion.* Dietrich praises Ayala for his "clear and lucid prose and incisive critique of design" — a conjunction of Ayala's deep understanding of both evolutionary science and Christian theology.

Michael Lienesch's *In the Beginning* traces anti-evolutionism from the beginnings of Fundamentalism to modern "intelligent design" creationism. Reviewer Kevin C Armitage writes that anti-evolutionism has exhibited a uniformity in its arguments against evolution — something that was a stumbling block for the defendants in Dover — despite all the changes in labels, euphemisms, and leading proponents.

All these and more await you on the inside.

RNCSE 28 (2) was printed in July 2008.

NEWS

Evolution Comes to Florida's Science Standards

Joshua Rosenau

On February 19, 2008, the Florida board of education passed new statewide science standards likely to leapfrog the state from last place in national assessments to the head of the class. Passing these standards was not easy, and even now, forces in Florida are working to undermine the state's new standards.

The old standards earned the grade of F in an assessment by the widely-respected Thomas B Fordham Foundation for many reasons. Not only was "[t]he E-word … sedulously avoided," but temperature and heat were erroneously treated interchangeably, "[t]he classification of simple machines is naïve, … [e]nergetics of phase change is presented misleadingly; treatment of electricity and magnetism, a central subject of school physics, is minimal."

To rectify these and other errors, the Department of Education assembled two teams of experts, one to frame the broad outline of world-class science standards, another to write those standards. When Lawrence S Lerner, a co-author of the Fordham report and professor emeritus of physics at California State University, Long Beach, reviewed a draft of the new standards, he was favorably impressed. In an assessment commissioned by NCSE, he wrote, "This draft is a giant step in the right direction. It is clear, comprehensive, and, most importantly, accurate." He told the writing committee, "With a little bit of extra effort, Florida could bring that up to an A."

Joshua Rosenau is Public Information Project Director for NCSE.

Lerner was not the only one to offer suggestions. An on-line comment system hosted by the Florida Department of Education received nearly 21 000 comments from over 10 000 reviewers. Sections of the standards related to evolution, and human evolution in particular, were the focus of attention, especially from religious groups opposing the language of the new standards. However, newspapers from around the state praised the standards, with the *Orlando Sentinel* (2007 Oct 27) opining, "It's taken seven years, but Florida is on its way to developing a science curriculum for the new millennium — one that requires teachers openly and vigorously to teach about evolution," adding, "It's important that the state Board of Education and Gov Charlie Crist fully endorse these changes to ensure Florida's children can compete in the increasingly technology-driven global marketplace."

Writing committee member Debra Walker addresses the Florida Board of Education

Surveying the forces arrayed against these standards, I told Wired News (2007 Dec 10), "My fear is that Florida will do something like happened in Kansas a couple years ago, with the Board of Education overruling the decisions made by the expert committee appointed to draft the new standards" (for details on the situation in Kansas, see *RNCSE* 2005 Jan/Feb; 25 [1]: 6–11; 2006 May/Jun; 26 [3]: 13–4). Similarly, NCSE's Glenn Branch told *Education Week* (2007 Nov 7), "I expect to see some of kind of organized effort [by opponents] to deprecate the standards."

Those warnings were prescient. A staffer at the Department of Education was disciplined in December 2007 for using her position to help stir up that opposition (see sidebar, p 6). She was not fired, but was instructed not to use her status in the department in arguing against the inclusion of evolution in the standards.

Opposition also came from county school boards. A dozen counties, mostly in northern Florida, passed resolutions calling for the state board to reject the new standards, or to revise them to weaken sections related to evolution. The suggested changes follow common creationist talking points, calling for evolution to be taught as "theory, not fact," for the standards to single out evolution by stressing its "strengths and weaknesses," or for "critical analysis" of that single topic. Not all such proposals were successful. The Highland County school board rejected such a resolution on February 5, 2008. And on February 12, 2008, the Monroe County school board actually passed a resolution supporting the standards as written, contending that "a scientifically educated workforce will benefit Florida's future economy," and urging the state board of education to adopt the new standards as written.

The state board also came under pressure from David Gibbs III, a lawyer with the Christian Legal Association who also represents creationist Nathaniel Abraham in his employment suit against Woods Hole (see Updates, p 16–8). Gibbs sent two memos to the Board of Education, both claiming that "the [writing] committee may have become monopolized by Fordham and other lobby-pressure

groups. … We are concerned that the underlying motive driving these pressure groups might be to inject a hostility to religion into objective science." He then suggested various changes which tended to soften strong statements of results in evolutionary biology. For instance, a benchmark that students should be able to "[i]dentify basic trends in hominid evolution from early ancestors six million years ago to modern humans" would have become "[i]dentify the types of hominid fossil evidence from the estimated six million years of hominid existence, and describe the types of evolutionary changes from those classified as early hominids to modern man, as suggested by this evidence."

With help from the Discovery Institute, writing committee member Fred Cutting, an engineer, issued a report dissenting from the draft standards. Though he claimed that this represented a "minority report," like the one taken up by the Kansas Board of Education in 2005, Cutting's dissent had no official status, and seems to have no support from the other committee members. He suggested adding "[s]tudents should learn why some scientists give scientific critiques of standard models of neo-Darwinian evolution or models of the chemical origin of life," and omitting any discussion of the age of hominin ancestors, changing the benchmark about hominin evolution to state that students should "[i]dentify the types of fossil hominids species and use critical and logical thinking to explain aspects of human origins that are documented, and those that are not documented by the fossil evidence."

Opposition also emerged at public hearings, including a hastily arranged meeting on February 11, eight days before the board was to vote on the new standards. At that meeting, the *St Petersburg Times* (2008 Feb 12) reported that a speaker "held up an orange and said that because of evolution, he now had irrefutable evidence that an orange was 'the first cousin to somebody's pet cat' and 'related to human beings.'" Another speaker addressed the supposed moral consequences of teaching evolution, with Darwin compared with Adolf Hitler, Joseph Stalin, and Mao Tse-tung. The *Orlando Sentinel* (2008 Feb 12) summarized, "Some speakers said they wanted creationism or intelligent design taught, while others said they just wanted what they called weaknesses in the theory of evolution talked about, too."

A number of scientists, educators, and citizens from around the state responded to the creationist complaints. A majority of the science standards writing committee itself urged the board to adopt the new set of standards, in a statement read by Gerry Meisels, a committee member and professor of chemistry at the University of South Florida. Meisels was quoted by the Associated Press (2008 Feb 11) as saying, "We are frustrated by the disproportionate publicity and the political pressure that has been brought to bear on decision makers. Yielding to these pressures would be a real disservice to Florida because it would not only seriously impede the education of our children but also create the image of a backward state." (For a longer excerpt from the statement by the writers and framers, see sidebar, p 8–9.)

Debra Walker, an archaeologist who serves on the Monroe County school board and on the writing committee, also urged the board to accept the new set of standards without tinkering. According to the *Orlando Sentinel*, Walker "said the current 'political meltdown over Darwinian theory' was proof that too many people had received a poor-quality science education. She noted that the school districts with some of the lowest science scores on the Florida Comprehensive Assessment Test were the ones complaining loudest about the new standards. 'Do we want these boards setting science policy in Florida? I think not.'"

Joe Wolf, president of the grassroots group Florida Citizens for Science, presented a petition signed by over 1500 supporters of the standards, describing evolution as "the central organizing concept that allows us to understand all biological sciences from medicine to forestry to entomology, and its principles are the theoretical basis that underlies major advances in all biological fields" and called on the board to accept the final draft. The *Lakeland Ledger* (2008 Feb 12) reported that Wolf warned the board, "It will be a sad day if Florida becomes the next Kansas" by rewriting the work of their expert committee.

In addition to the petition organized by Florida Citizens for Science, Americans United for Separation of Church and State sent a letter encouraging the board to resist efforts to undermine the treatment of evolution in the standards. And the American Institute for Biological Sciences followed suit, telling the board, "The biologists and science educators represented by AIBS, and the scientific community as a whole, agree that there is no research supporting either creationism or 'intelligent design' or challenging the importance of evolution for explaining the history and diversity of life." The American Association for the Advancement of Science sent letters supporting the standards to the entire board, and the National Academy of Sciences sent a similarly laudatory message in response to a query from board member Roberto Martinez. (For excerpts from these statements, see sidebar, p 8–9.)

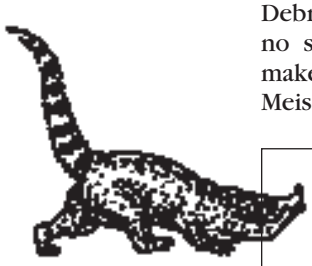
Creationists continued to lobby the board to compromise the treatment of evolution after these hearings. John Stemberger, president and general counsel for Florida Family Policy Council, complained to the *Lakeland Ledger* (2008 Feb 12) that critics of the standards had not been given enough chances to speak to the board directly: "We will lobby the commissioner and governor until we get our 15 minutes each before the board." According to the *St Petersburg Times* (2008 Feb 12), "The groups promised to bombard Gov Charlie Crist and other state officials with thousands of requests until the board says okay."

Less than a week before the final vote on the standards, it was reported that the board, bowing to pressure from the public and state legislators, had asked state commissioner of education Eric Smith to redraft the standards, inserting the phrases "scientific theory of"

and "scientific law of" before mentions of evolution, plate tectonics, electromagnetism, and gravity. A spokesperson for the department told the *Orlando Sentinel* (2008 Feb 16) that the new version was vetted by the writing committee, but a later report in the *Sentinel* (2008 Feb 17) suggested that a majority of the committee opposed the changes, quoting Debra Walker as saying, "There is no scientifically sound reason to make these changes" and Gerry Meisels (a professor of chemistry at the University of South Florida) describing them as "clumsy".

Then the opponents of the standards were granted one of their wishes, when the Board of Education announced that twenty members of the public would be given three minutes each to address the board at its meeting, with ten speaking in favor of the standards, ten speaking against them. Following that comment period, the board would consider whether to adopt the standards.

Among those speaking for the standards were Jonathan Smith of Florida Citizens for Science, writing committee members Debra Walker and Gerry Meisels, Joseph Travis (the Dean of Arts and Sciences at Florida State University), and Nobel laureate Sir Harold Kroto, who also composed an op-ed for the *Ft Myers News-Press* (2008 Feb 16), in which he praised the medical benefits derived from evolutionary biology, and worried that if anti-evolution forces prevailed, "they will seriously impede the ability of the next



Department of Education Staffer "Counseled" for Lobbying Against Evolution

The *St Petersburg Times* (2007 Dec 8) reported that Selena "Charlie" Carraway, a staffer in the Florida Department of Education, identified herself as such in a personal e-mail that urged her fellow Christians to oppose the standards she would be responsible for implementing.

According to the *Times*, Carraway's epistle began:

> My name is Charlie Carraway, and I'm a member of Sopchoppy Southern Baptist Church, Sopchoppy, Florida, but I also work for the Florida Department of Education as the Director of the Office of Instructional Materials. That means I oversee the adoption process of books and materials in the state, and I work in close proximity to the folks in the Office of Mathematics and Science, who have been in charge of the revision of the science standards. I say all of this, obviously, to give this e-mail credibility, so that you'll continue to read and pass on the information I'm sharing with you.
>
> A lot of people don't understand "why all the fuss about the new science standards," so I thought I would try to give more background information. The science standards that are in place now do not include the word evolution anywhere. In fact, they are ambiguous enough that the districts and schools in Florida have been able to teach evolution as a theory along with other theories. In addition to that, if these new standards are adopted, the new instructional materials adopted and placed in our schools will be aligned to these standards, which means that our new materials will explicitly teach evolution — and not as a theory!!!

She continued:

> Once these become adopted standards and benchmarks, … students will be held accountable to learn these benchmarks. Districts will not have a choice in teaching evolution as a theory, but will be expected to teach it as stated in these standards, big ideas, and benchmarks. Why? Why is this change necessary? Whose agenda is this and will the Christians in Florida care enough to do something about it? …
>
> Please encourage interested parties to write the State Board members in the Department of Education and let them know how they feel about the change to these standards. The State Board will have the final say as to whether these standards are approved. …
>
> Please join me in keeping these standards from being approved and adopted by our State Board of Education…. The least we can do is make sure evolution is presented to our children and grandchildren as a theory as it has been in the past. Hopefully, though, we can do better than that.

Unlike Chris Comer in Texas (see *RNCSE* Jan/Feb 2008; 28 [1]: 4–7), Carraway was not forced to resign for her transgression. She was merely warned not to abuse her position again. Department of Education spokesman Tom Butler told the *Times*, "It is inappropriate for any department employee to use [her] public position to advocate their personal positions. Ms Carraway has been counseled."

NCSE's executive director Eugenie C Scott commented, "Now she has a second chance, and hopefully she'll behave more responsibly," and Florida Citizens for Science's Joe Wolf concurred, saying, "I think she's allowing her religious beliefs to interfere with her public duty," adding, "I wish she hadn't done it. But I think it's an internal matter." A forceful editorial in the *Times* (2007 Dec 10) disagreed, however, contending, "Firing would be more in order" for Carraway.

cohort of young scientists to create the defenses we shall need in the fight against debilitating diseases over the next century."

During a lively debate lasting about sixty minutes, board member Donna Callaway proposed a so-called "academic freedom" amendment to the standards to counter what she described as the "dogmatic" tone of the standards with respect to evolution. The *Miami Herald* (2008 Feb 19) reported, "The amendment would have given teachers the explicit permission 'to engage students in a critical analysis of that evidence.'" She was unable to obtain a second to her motion, however.

Ultimately, the version of the standards edited to add "scientific theory" was adopted by a 4–3 vote. Joining Callaway in voting against the standards were evolution supporters Akshay Desai and Roberto Martinez, although for very different reasons. Martinez in particular fiercely defended the standards as drafted, brandishing the letter from the National Academy of Sciences endorsing the writing committee's version, and asking pointed questions about the development of the new version.

Martinez was quoted by the Associated Press (2008 Feb 19) lamenting, "What we have here is as an effort by people to water down our standards."To judge from the reaction of creationists, however, even the new version of the standards was too much. The Associated Press also reported that the Florida Family Policy Council, disappointed in the board's vote, planned to seek legislation to ensure "academic freedom" with respect to evolution.

Supporters of accurate science education were generally positive, albeit with reservations, about the outcome. Asked for comment about the board's vote by *Education Week* (2008 Feb 19), Florida Citizens for Science's Brandon Haught answered, "The standards, as approved, are a huge step forward for our Florida schools ...They're light years ahead of what's been used in the state." I agreed with Haught's assessment, telling *Education Week*, "This is a win for science overall."

NCSE's Glenn Branch, writing

for Beacon Press's blog (reprinted in *RNCSE* Jan/Feb 2008; 28 [1]: 9–10), observed, "Evolution is still described, correctly, as 'the organizing principle of life science' and as 'supported by multiple forms of evidence.' And the standards distance themselves from the pejorative sense of 'theory' that creationists from [William Jennings] Bryan onward like to exploit: 'a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.'"

The eminent biologist Paul R Gross, lead author of the 2005 Fordham Foundation report that awarded the grade of F to Florida, was less sanguine, describing the revisions to the standards as "transparent and wacky" in the *Tallahassee Democrat* (2008 Feb 25). Gross argued, "The standards refer persistently to the scientific theory of evolution, so should they not at least touch upon the implied nonscientific theories of evolution? Surely we should ask, 'Are there any such theories?' No. Not for any serious scientific or any other educational purpose. What then, pray, is the point of belaboring, with the pompous prefix 'scientific theory of,' the following: evolution, cells, geology, atoms?" He added, "In fact, it provides inside Florida's new standards a perfect counter-example to the intellectual integrity the standards themselves promote."

The revisions, in any case, were obviously not enough to satisfy Florida's creationists, including board member Donna Callaway, who pressed for the so-called academic freedom amendment. The next fight may be in the state legislature: Florida House of Representatives Speaker Marco Rubio (R–District 111) told the *Florida Baptist Witness* (2008 Feb 21) that he thought that the House would be receptive to legislation revising the standards along the lines proposed by Callaway. The *Orlando Sentinel* (2008 Feb 23) editorially criticized the idea, writing, "This academic-freedom law is just an attempt to sneak creationism through the schoolhouse's back door. ... Even with the last-minute compromise, the new science curriculum is a huge improvement. Leave it alone." (As this issue goes to press, such legislation narrowly failed in both houses of the state legislature. Developments will be chronicled in a future issue of *RNCSE*.)

Floridians can be proud of their new standards, but this is just the first step in improving the state's science education. The inclusion of evolution in the new standards puts the state in strong position to improve classroom handling of evolution as well as the quality of textbooks and the tests which measure science education. Textbook adoption begins later in 2008, and will be finalized in 2011. The tests based on these new standards are being written now, after which they will be field tested and ultimately go into use in 2010, with a more thorough revision to be rolled out in 2013. The dozen county boards of education which passed resolutions against the standards are also of particular concern. NCSE will continue to work with grassroots groups energized by this fight to ensure that the standards are implemented fully and accurately through those statewide processes, and especially in local schools, and to build support for accurate science education in the legislature.

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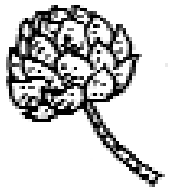
Statements in Support of the New Florida Standards



Lawrence S Lerner

The recently published draft of the new science standards is a giant step in the right direction for Florida. Generally speaking, the document is cogent, comprehensive, and accurate. …

Especially laudable is the coverage of the biological sciences, with evolution in its place as the foundation and central principle of the discipline as a science. As is appropriate, some of the basic concepts appear as early as kindergarten, and there is a steady build-up in depth and sophistication, appropriate to the maturation of the student as he or she progresses through the grades. At the high-school level, the coverage is quite comprehensive. … the Florida science standards … represent a dramatic improvement over past versions.

Framers and Writers

We are members of the committees of Framers and Writers that composed the proposed Florida Science Education Standards that were released on February 1, 2008. Widely acclaimed nationally and statewide by education experts and scientists, the standards have understandably generated opposition from special interest groups because of the standards' honest and straightforward presentation of evolution as the only scientific theory able to explain innumerable facts and observations that have been gathered over 150 years. There is no longer any valid scientific criticism of the theory of evolution. There are no scientific explanations of this observable evidence other than evolution. …

As dedicated citizens we are committed to helping Florida's children be competitive in the modern world. We are frustrated by the disproportionate publicity and the political pressure that has been brought to bear on decision-makers. Yielding to these pressures would be a real disservice to Florida because it would not only seriously impede the education of our children but also create the image of a backward state, raising the risk of Florida's being snubbed by biotechnology companies and other science-based businesses, thus damaging our state's economy. …

The science standards are the product of hard volunteer work by knowledgeable educators, scientists and citizens from throughout the state and reflect their best judgment and expertise. We ask that the Florida Board of Education approve the new standards as submitted to the Board by the Florida Department of Education.

[signed by 40 framers and writers]

American Institute of Biological Sciences

The American Institute of Biological Sciences (AIBS) supports the draft Florida science standards…. We encourage you to approve these standards, which science education experts consider a dramatic improvement over earlier versions. …

The future educational, employment, and economic growth potential of Florida and the United States depends upon a scientifically literate workforce and a population capable of making informed decisions. A strong foundation in science is required to fuel the advances in research, development, and innovation that are critical to the Florida economy. Thus, we encourage you to support Florida students and teachers by adopting the revised science education standards. ...

The validity and importance of evolution to biology and the broader scientific enterprise is not decided by public opinion polls or by petitions, but through the rigorous method by which scientists conduct and evaluate research. The scientific community agrees with the draft standards' statement that "Evolution is the fundamental concept underlying all of biology and is supported by

Anti-Evolution Legislation in the Bayou State

Eugenie C Scott and Glenn Branch

Senate Bill 561, styled the "Louisiana Academic Freedom Act," was prefiled in the Louisiana Senate by state senator Ben Nevers (D–District 12) on March 21, 2008, and provisionally assigned to the Senate Education Committee, of which Nevers is the chair. In name, the bill is similar to the so-called academic freedom bills in Florida, House Bill 1483 and Senate Bill 2692, which are evidently based on a string of similar bills in Alabama as well as on a model bill that the Discovery Institute's Center for Science and Culture, the institutional home of "intelligent design" creationism, recently began to promote. But in its content, Louisiana's SB 561 seems to be modeled instead on a controversial policy adopted by a local school board in 2006 with the backing of the Louisiana Family Forum.

The Ouachita Parish School Board's policy permits teachers to help students to understand "the scientific strengths and weaknesses of existing scientific theories pertinent to the course being taught"; "biological evolution, the chemical origins of life, global warming and human cloning" are the only topics specifically mentioned. A local paper editorially described it as "a policy that is so clear that one School Board member voted affirmatively while adding, 'but I don't know what I'm voting on'" (*Monroe News-Star*, 2006 Dec 3; see *RNCSE* 2006 Nov/Dec; 26 [6]: 8–11).

The controversy over the policy was renewed in September 2007, when Senator David Vitter (R–Louisiana) sought to earmark $100 000 of federal funds to the Louisiana Family Forum. The New Orleans *Times-Picayune* (2007 Sep 22) reported that the money was intended to "pay for a report suggesting 'improvements' in science education in Louisiana, the development and distribution of educational materials and an evalu-

multiple forms of scientific evidence." … The biologists and science educators represented by AIBS, and the scientific community as a whole, agree that there is no research supporting either creationism or "intelligent design" or challenging the importance of evolution for explaining the history and diversity of life.

The inclusion of non-scientific alternatives to evolution such as creationism or "intelligent design" in the curriculum would misinform and distract students from understanding accepted evolutionary theory. There is no justification for singling out evolution for special skepticism or critical analysis. Its strength as a scientific theory matches that of the theory of gravitation, atomic theory, and the germ theory.

The National Academy of Sciences

We fully support efforts by the committee that drafted the revisions to Florida's science standards to include evolution as an integral component of modern science education for students in your state. Standard 15A for Grades 9–12 echoes the positions of the National Academy of Sciences and the Institute of Medicine succinctly and eloquently:

> Evolution is the fundamental concept underlying all of biology and is supported by multiple forms of scientific evidence.

[T]hese draft standards … reflect the fact that the study of evolution is one of the most robust of disciplines in modem biology. These standards and benchmarks are entirely consistent with longstanding positions of the National Academy of Sciences [and] the Institute of Medicine, and reflect the overwhelming consensus of the scientific community based upon the massive and continually accumulating body of evidence that supports evolution as the most complete scientific explanation for the past and present diversity of life that is observed on earth.

We are also pleased to see that, consistent with recommendations in the *National Science Education Standards* (published in 1996 by the Academy's National Research Council) the draft Florida standards introduce students to concepts related to evolution in the elementary grades and build upon those expectations as students move to biology courses in the secondary grades.

In summary we applaud the efforts of the writing committee and the product of their work. These standards are both explicit in recognizing evolution as a central organizing principle of modern biology and lay out the many types and levels of evidence about evolution about which Florida students should learn.

Alan I Leshner, Chief Executive Officer of the American Association for the Advancement of Science

On behalf of the American Association for the Advancement of Science, I write to voice my support for the inclusion of evolution in the final draft of the new science standards for Florida schools… .

The theory of evolution underpins all of modem biology. Although critics claim that it is "just a theory," in fact there is virtually no controversy about evolution among the overwhelming majority of scientists, many of whom are deeply religious. It is supported by tens of thousands of scientific studies in fields that include cosmology, geology, paleontology, genetics and other biological specialties. Evolution informs scientific research in a broad range of fields such as agriculture and medicine, work that impacts our every day lives.

We applaud the State of Florida for seeking to provide its students with a firm understanding of evolution and other essential scientific concepts, which will help prepare them to compete for high-skill jobs in an increasingly high-tech world economy. I urge you to protect the future of science education in Florida and reject attempts to undermine the teaching of evolution.

ation of the effectiveness of the Ouachita Parish School Board's 2006 policy that opened the door to biblically inspired teachings in science classes." Thanks to pressure from NCSE and its allies, Vitter withdrew his proposal in the following month (see *RNCSE* 2007 Sep–Dec; 27 [5–6]: 9–12).

Now SB 561 echoes the central language of the Ouachita Parish School Board's policy. Contending that "the teaching of some scientific subjects, such as biological evolution, the chemical origins of life, global warming, and human cloning, can cause controversy, and that some teachers may be unsure of the expectations concerning how they should present information on such subjects," the bill extends permission to Louisiana's teachers to "help students understand, analyze, critique, and review in an objective manner the scientific strengths and scientific weaknesses of existing scientific theories pertinent to the course being taught."

Unlike the policy, the bill contains directives aimed at state and local education administrators, who are instructed to "endeavor to create an environment within public elementary and secondary schools that encourages students to explore scientific questions, learn about scientific evidence, to help students develop critical thinking skills, and respond appropriately and respectfully to differences of opinion about controversial issues" and to "endeavor to assist teachers to find more effective ways to present the science curriculum where it addresses scientific controversies." Administrators are also instructed not to "censor or suppress in any way any writing, document, record, or other content of any material which references" the listed topics.

Attempting to immunize itself against a likely challenge to its constitutionality, the bill also claims to protect only "the teaching of scientific information," adding that it "shall not be construed to promote any religious doctrine, promote discrimination for or against a particular set of religious beliefs, or promote discrimination for or against religion or non-religion." The involvement of the Louisiana Family Forum — which seeks to "persuasively present biblical principles in the centers of influence

on issues affecting the family through research, communication and networking" — managed, however, to provoke a careful scrutiny of the intent of the bill's backers.

Writing in the *Times-Picayune* (2008 Mar 30), the columnist James Gill observed that SB 561 is based on "the spurious premise that evolution is a matter of serious scientific debate and that both sides are entitled to a hearing. A lot of people have fallen for that line, including Gov Bobby Jindal, although, of course, scientists, save a few stray zealots, regard the evidence for evolution as overwhelming." He also drew attention to a particularly problematic provision of SB 561 directing administrators not to "censor or suppress in any way any writing, document, record, or other content of any material" referring to the topics covered by the bill, which he described as "a license for crackpots." Gill concluded, "The bill is of no conceivable benefit to anyone but Christian proselytizers. Besides, its genesis is plainly sectarian."

A day after the legislative session began on March 31, 2008, the sponsor of SB 561 was in the news, denying that the so-called academic freedom bill would pave the way for creationism to be taught in the state's public schools. According to the Baton Rouge *Advocate* (2008 Apr 1), Nevers said, "I believe that students should be exposed to both sides of scientific data and allow them to make their own decisions," adding, "I think the bill perfectly explains that it deals with any scientific subject matter which is taught in our public school system." The bill in fact specifically identifies "biological evolution, the chemical origins of life, global warming, and human cloning" as controversial subjects, and calls on state and local education administrators to "endeavor to assist teachers to find more effective ways to present the science curriculum where it addresses scientific controversies."

Nevers acknowledged that he introduced SB 561 at the behest of the Louisiana Family Forum. A religious right group with a long history of promoting creationism and attacking evolution education in the state, the LFF claims that it "promotes 'Teaching the Controversy' when it comes to matters such as biologicial [*sic*] evolution"; yet it elsewhere recommends a variety of young-earth and "intelligent design" websites, including the Institute for Creation Research, the Foundation for Thought and Ethics, and Kent Hovind's Creation Science Evangelism, on its own website. Unsurprisingly, then, the executive director of Americans United for Separation of Church and State, the Reverend Barry Lynn, told the *Advocate*, "This is all about God in biology class."

Speaking later to the *Hammond Daily Star* (2008 Aprl 6), Nevers was less cautious in explaining the purpose of the bill. The newspaper reported, "The Louisiana Family Forum suggested the bill, Nevers said. 'They believe that scientific data related to creationism should be discussed when dealing with Darwin's theory. This would allow the discussion of scientific facts,' Nevers said. 'I feel the students should know there are weaknesses and strengths in both scientific arguments.'" The article itself was headlined "Bill allows teaching creationism as science."

Barbara Forrest, a professor of philosophy at Southeastern Louisiana University who serves on NCSE's board of directors, told the *Daily Star*, "If the citizens and public officials of Louisiana are serious about improving both the state's image and public schools, we cannot afford to waste valuable time and resources on legislation like SB 561. Such battles consume the energies and attention of productive citizens who must take time from their jobs and personal affairs to counteract creationist attacks on their school systems."

Before the bill received a committee hearing, the *Shreveport Times* (2008 Apr 14) took a firm editorial stand against it, writing, "Even though it is presented with an attractive title and couched in the newest terms, Senate Bill 561 is not in the best interest of students, educators or religious leaders. It would open the door for high school science class curricula and discussions concerning matters best left to individual faith, families and religious institutions. The bill proposes bad law that has been tried before and has been struck down repeatedly by the courts," and concluding, "Religious doctrine and the science classroom must remain separate, and SB 561 should be ditched in committee."

But it was not to be. Renamed the "Louisiana Science Education Act," the bill passed the Louisiana Senate Education Committee on April 17, 2008, despite the testimony of what the *Times-Picayune* (2008 Apr 18) described as "a bank of witnesses" who "blasted the proposed Louisiana Science Education Act as a back-door attempt to inject the biblical story of creation into the classroom." The *Advocate* (2008 Apr 18) reported that William Hansel, a scientist at Louisiana State University's Pennington Biomedical Research Center, told the committee, "nearly all scientists oppose passage of this bill," adding that if enacted, the bill "will be seized upon as one more piece of evidence that Louisiana is a backward state by those who have popularized this image of our state."

Before its passage, the bill was not only renamed but also renumbered (as SB 733) and revised, with the removal of the "strengths and weaknesses" language and the list of specific scientific topics. Even the sanitized version of the bill is likely to continue to spark controversy, owing to its creationist antecedents, from which its supporters may be unable to disentangle themselves. For example, David Tate, a supporter of the bill who serves on the Livingston Parish School Board, told the *Times-Picayune*, "I believe that both sides — the creationism side and the evolution side — should be presented and let students decide what they believe," and added that the bill is needed because "teachers are scared to talk about" creation.

The *Advocate* (2008 Apr 19) editorially agreed that the antecedents of the bill were problematic, writing, "it seems clear that the supporters of this legislation are seeking a way to get creationism — the story of creation as told in the biblical book of Genesis — into science classrooms." Acknowledging the revisions of the bill, the editorial commented, "At this point, the wording of the

bill seems more symbol than substance. But its implication — that real science is somehow being stifled in Louisiana's classrooms — does not seem grounded in actual fact. This kind of rhetorical grandstanding is a needless distraction from the real problems the Legislature should be addressing."

Speaking to the *Advocate* (2008 Apr 20), the executive director of the Louisiana Family Forum, Gene Mills, expressed disappointment at the revisions to the bill: "We want an explicit expression," he said. "We wanted to hang out a sign that said academic inquiries welcomed." He described his support of the revised bill as now only lukewarm, even though Nevers told the newspaper that the revisions "didn't change the intent of the bill." However, Barbara Forrest commented, "The bill itself is still a very problematic bill, a stealth creationism bill," explaining, "The strategy now is to sanitize the terminology, which is what they did with the original bill and which they are doing now."

Subsequently, however, the bill was partly unsanitized. As the *Advocate* (2008 Apr 29) reported, "In a key change, the Senate approved an amendment by Nevers that spells out examples of those theories, including evolution, the origins of life, global warming and human cloning. That language was removed from the bill earlier this month at the request of critics before it was approved by the Senate Education Committee, which Nevers chairs." Also added was a provision requiring teachers to use the textbook provided by the local school system; it was apparently feared that otherwise teachers might use only the supplemental textbooks that the bill would, if enacted, allow them to use "to help students understand, analyze, critique, and review scientific theories in an objective manner." The language about "strengths and weaknesses" was not restored. The Senate passed the amended bill by a vote of 35 to 0.

SB 733 was sent to the House of Representatives on April 29, 2008, and referred to its Committee on Education. A version of the same bill, HB 1168, was previously introduced in the House on April 21, 2008, and referred to the same committee. Its sponsor, Frank A Hoffman (R–District 15) was formerly the assistant superintendent of the Ouachita Parish School System, which in 2006 adopted the controversial policy on which HB 1168 and SB 561/733 are based. The *Advocate* (2008 May 1) expressed editorial concern about the prospects of the legislation, writing, "The 35–0 vote on this issue suggests few senators have the inclination or will to stand up to the religious right in defense of sound science in the classroom. It's quite possible this bill also will be approved in the House and end up on [Governor Bobby] Jindal's desk."

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A Setback for the ICR in Texas

Glenn Branch

When the Institute for Creation Research moved its headquarters from Santee, California, to Dallas, Texas, in June 2007, it expected to be able to continue offering a master's degree in science education from its graduate school. A preliminary assessment of the ICR's facilities by a committee from the Texas Higher Education Coordination Board described the educational program as "plausible," adding, "The proposed degree would be generally comparable to an initial master's degree in science education from one of the smaller, regional universities in the state." But the state's scientific and educational leaders voiced their opposition, and at its April 24, 2008, meeting, the Texas Higher Education Coordination Board unanimously voted to deny the ICR's request for a state certificate of authority to offer the degree.

It was not the first time that the ICR's graduate school was embroiled in regulatory controversy. The ICR first began to offer graduate degrees in 1981, choosing not to seek accreditation for the program: according to Raymond A Eve and Francis B Harrold's *The Creationist Movement in Modern America* (Boston: Twayne, 1991), "Henry Morris thinks it would be futile to try, since higher education is controlled by evolutionists" (p 122). But it applied for, and received, approval for the program from the state superintendent of public education, which was necessary for it to award degrees in California. In 1988, when it attempted to have the approval renewed, it encountered difficulties when the then superintendent of public instruction, Bill Honig, deemed its facilities and curriculum to be below the standard of comparable accredited schools.

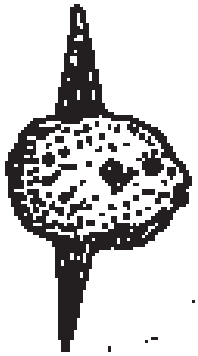
Faced with a revocation of its state approval, the ICR filed suit. The case was eventually settled, and the ICR's graduate school was granted a religious exemption from the usual requirements for state approval. Meanwhile, the ICR was also moving to seek accreditation from a source presumably not "controlled by evolutionists" — the Transnational Association of Christian Colleges and Schools, founded in 1979. As of 2008, TRACS requires candidate institutions to affirm a list of Biblical Foundations, including "the divine work of non-evolutionary creation including persons in God's image"; TRACS's own Biblical Foundations statement, offered as a model, affirms the "[s]pecial creation of the existing space-time universe and all its basic systems and kinds of organisms in the six literal days of the creation week."

TRACS became a federally recognized accreditation agency in 1991, when Secretary of Education Lamar Alexander, overruling the recommendation of his advisors, approved it as such. The decision was controversial, even eliciting a short (and now hard-to-find) book, *Where the TRACS Stop Short* (Ambler [PA]: Institute on Religion and Law, 1993), from the degree-mill critic Steve Levicoff. After receiving approval from the Department of Education, TRACS promptly accredited the ICR's graduate school, thus contributing further to the controversy, for the

chair of the board of directors of TRACS at the time was none other than Henry Morris, the ICR's founder and then president. Despite the controversy, the ICR's graduate school continued to enjoy TRACS accreditation until it voluntarily relinquished it in November 2007.

In the October 2007 issue of the ICR's publication *Acts & Facts*, its president John Morris explained:

> The possibility of moving to Dallas surfaced when my brother, Dr Henry Morris III, discerned that a central location would be beneficial for ICR, with several possibilities for student services at nearby affiliated colleges. The many good churches and large numbers of ICR supporters living in North Texas made it a natural fit for the ministry. ... In 2006, ICR opened a distance education effort in Dallas, as well as the hub of ICR's internet ministries. ... As additional operational functions were assigned to the new Dallas office, the Board concluded that it was in ICR's best interests to move the entire ministry.



When the ICR moved to Dallas, however, its graduate school entered a new regulatory environment. TRACS is not recognized by the state of Texas, forcing the ICR to seek temporary state certification for its graduate school while it applies for accreditation from the Southern Association of Colleges and Schools. As a first step toward certification, a committee of Texas educators appointed by the Texas Higher Education Coordination Board (THECB) visited the ICR's facilities in Dallas to evaluate whether the ICR meets the legal requirements for state certification. The committee's report (available on-line at <http://www.texscience.org/reviews/ICR-Site-Visit-Report-and-ICR-Response.pdf>) described the educational program as "plausible". (The committee members were a librarian, an educational administrator, and a mathematician; none was professionally trained in biology, geology, or physics.)

NCSE's Eugenie C Scott disagreed with their judgment, telling the *Dallas Morning News* (2007 Dec 15), "It sounds like the committee may have just taken at face value what the ICR claims ... There's a huge gulf between what the ICR is doing and what they're doing at legitimate institutions like ... [the University of Texas] or Baylor." *Inside Higher Ed* reported (2007 Dec 17; available on-line at <http://www.insidehighered.com/news/2007/12/17/texas>), "Some science groups are aghast by the idea that Texas would authorize master's degrees in science education that are based on complete opposition to evolution and literal acceptance of the Bible. And these groups are particularly concerned because the students in these programs would be people who are or want to be school teachers."

Although Patricia Nason, chair of the ICR's science education department, told the *Dallas Morning News*, "Our students are given both sides. They need to know both sides, and they can draw their own conclusion," the ICR's statement of faith includes the tenet, "All things in the universe were created and made by God in the six literal days of the creation week described in Genesis 1:1–2:3, and confirmed in Exodus 20:8–11. The creation record is factual, historical and perspicuous; thus all theories of origins or development which involve evolution in any form are false." Similarly, applicants to the ICR's graduate school are explicitly told that their answers to the essay questions on the application help to determine "your dedication to the Lord, the Word, and teaching creation science."

According to the *Dallas Morning News*'s article, the ICR's graduate program "offers typical education classes, teaching such fundamentals as how to use lab equipment, the Internet, and PowerPoint in the classroom. But it also offers a class called 'Advanced Studies in Creationism.' And the course Web page for 'Curriculum Design in Science' gives this scenario: 'The school board has asked you to serve on a committee that is examining grades 6–12 science goals. ... Both evolutionist and creationist teachers serve on the curriculum committee. How will you convince them to include creation science as well as evolution in the new scope and sequence?'" The ICR's graduate school's website repeatedly declares, "ICR maintains that scientific creationism should be taught along with the scientific aspects of evolutionism in tax-supported institutions."

The Texas Commissioner of Higher Education, Raymund Paredes, was initially cagey about the committee's report. He told the *San Antonio Express-News* (2007 Dec 19), "Because this controversy is so potentially hot, we owe it to both sides to be absolutely fair in evaluating it. ... Maybe the real issue here is to put this proposal in the right category. Maybe it's not a program in science education. Maybe it's a program in creation studies. Then we have to decide whether that is a legitimate field or not." *The New York Times* (2007 Dec 19) reported, "Asked how the institute could educate students to teach science, Dr Paredes, who holds a doctorate in American civilization from the University of Texas and served 10 years as vice chancellor for academic development at the University of California, said, 'I don't know. I'm not a scientist.'"

The American Institute for Biological Sciences was quick to take a stand. Its president, NCSE Supporter Douglas Futuyma of SUNY Stony Brook, wrote in a December 28, 2007, letter to the THECB:

> ICR is committed to advancing Young Earth Creationism, a literal view of the Bible that contends the earth is less than 10 000 years old. Young Earth Creationism has repeatedly been shown, legally and scientifically, to be a religious belief system and not a credible scientific explanation for the history of earth or the diversity of biological systems that have evolved on earth. ... It is unacceptable for the state to sanction the training of science educators

committed to the practice of advancing their religious beliefs in a science classroom. ... The THECB will ill-serve science students if it certifies a science teacher education program based on a religious world-view rather than modern science.

Subsequently, the Texas Higher Education Coordination Board, which Paredes chairs, decided to review the assessment and to request further documentation from the ICR, rescheduling its decision from January 24, 2008, to April 24, 2008. Paredes explained to *Education Week* (2008 Jan 2) that the preliminary assessment focused on whether the ICR's graduate school is a stable institution with adequate resources. Now, however, the THECB would consider the merits of the program itself. "Our primary objective in looking at this program is to make sure any master's degree in science education will prepare teachers who can get students in high school ready to do college-level work in science," he said. NCSE's Joshua Rosenau was dubious about whether the ICR's program qualified, telling *Education Week* that presenting a creationist perspective as a rival to evolution is "presenting nonscience".

As part of the review, the *Austin American-Statesman* (2008 Jan 10) reported, "Paredes has asked an informal panel of scientists and science educators to comment on the institute's curriculum, which is flavored with a Christian worldview." Although members of the panel were asked not to talk to the press, the newspaper inferred, "It's likely that panelists favor a curriculum free of creationist views," citing the fact that one panelist signed a letter protesting the Texas Education Agency's treatment of Chris Comer (see *RNCSE* 2008 Jan/Feb; 28 [1]: 4–7), who was forced to resign for not remaining "neutral" about teaching evolution. Paredes stressed, however, that his goal was "making sure both ICR and the scientific and science education community have a full opportunity to express their views on this proposal."

Paredes also reportedly floated the idea that the ICR's graduate school revise its goal to offer a degree not in science education but in creation studies, a proposal that Steven Schafersman of the grassroots pro-science group Texas Citizens for Science applauded, telling the *American-Statesman*, "It would be churlish to deny ICR the ability to grant a graduate degree when we allow theology schools and Bible colleges to grant graduate degrees ... What we object to is letting them grant a degree in science education. That is a prevarication." However, a spokesperson for the THECB would not confirm that the idea of a degree in creation studies was suggested, telling the *Dallas Morning News* (2008 Jan 11) that "no specific recommendations" have been made.

Interviewed by *Inside Higher Ed* (2008 Jan 16; available on-line at <http://www.insidehighered.com/news/2008/01/16/icr>), Paredes disclosed that he asked the ICR for further information regarding some specific areas of concern. He wanted to know how the ICR planned to ensure that students in the on-line program would be exposed to the experimental side of science. He also expressed concern about the ICR's curriculum — "Their curriculum doesn't line up very well with the curriculum available in conventional master of science programs here in Texas," he said. "I wanted them to either revise the curriculum or explain why it departed from the norm" — and its claims about the research conducted by its faculty members.

While the application was on hold, the THECB was inundated by e-mails. Invoking the Texas Public Information Act, both the *Austin American-Statesman* and the *Dallas Morning News* received almost 300 pages of e-mails to the THECB, supporting and opposing the ICR's application. "Many of the notes are from Texas," the *Morning News* (2008 Jan 23) observed. "But others come from all corners of the US and the world — from Florida to the Philippines, Nevada to Nigeria." Among the missives in opposition were "some of the state's leading physicians and scientists," the *American-Statesman* (2008 Jan 24) reported, "including a Nobel laureate [Robert F Curl Jr of Rice University, who won a Nobel Prize in Chemistry in 1996] who warned that Texas is at risk of becoming 'the laughingstock of the nation.'"

Curl was not the only Texas laureate to express opposition to the ICR's application. Steven Weinberg of the University of Texas at Austin, who won a Nobel Prize in Physics in 1979, wrote, "it would be a blow to science education in Texas, and an embarrassment for Texas." Alfred G Gilman — a winner of the Nobel Prize in Physiology or Medicine in 1994; executive vice president, provost, and dean at the University of Texas Southwestern Medical School; and a Supporter of NCSE — asked, "How can Texas simultaneously launch a war on cancer and approve educational platforms that submit that the universe is 10 000 years old?" (In 2003, Gilman was active in resisting attempts to undermine the treatment of evolution in the textbooks then under consideration by the state board of education; see *RNCSE* 2003 Sep–Dec; 23 [5–6]: 8.)

Also weighing in was Daniel W Foster of the University of Texas Southwestern Medical Center and the president of the Academy of Medicine, Engineering, and Science of Texas, which seeks "to provide broader recognition of the state's top achievers in medicine, engineering and science, and to build a stronger identity for Texas as an important destination and center of achievement in these fields"; its members include over 200 Texas members of the National Academy of Sciences, the Institute of Medicine, and the National Academy of Engineering. "We should only teach true science in Texas schools and universities, not pseudoscience," Foster wrote to the THECB. "It is crucially important for our students and for the state. [I]t will be a very negative thing if our state becomes labeled as anti-science." The Texas Academy of Sciences and the Biological Sciences Curriculum Study also offered their input (see sidebars, p 14 and 15).

As the meeting of the THECB neared, the Texas Freedom Network issued a press release on April 21, 2008, reporting, "A survey

of science faculty at Texas colleges and universities reveals overwhelming opposition to state approval for a master's degree in science education from a Dallas-based creationist group." The online survey, conducted by Raymond A Eve for the Texas Freedom Network and the National Center for Science Education, polled 881 science faculty members at fifty public and private Texas universities about whether the Texas Higher Education Coordinating Board should certify a master's degree in science education from the Institute for Creation Research. Nearly 200 faculty members responded, with 185 (95% of respondents) opposed to certifying the program and 6 (3%) in favor.

"Our universities should be training science teachers who can provide a 21st-century education in Texas classrooms," said Kathy Miller, president of the TFN Education Fund. "Approving degree programs that instead promote a false conflict between science and faith would be a disservice to students and a threat to our state's reputation as a center for science and research." The press release (available on-line at <http://www.tfn.org/site/News2?page=NewsArticle&id=5353>) contained a sampling of comments from the faculty members surveyed: for example, Matthew Rowe, a biologist at Sam Houston State University, commented, "The great state of Texas can ill-afford either the cost, or the international embarrassment, of conflating faith-based religious doctrine with scientific empiricism."

At its April 24, 2008, meeting, the THECB unanimously voted to deny the ICR's request. The board's vote accorded with a recommendation issued on April 23, 2008, by the board's Academic Excellence and Research Committee, which in turn was based on a recommendation by Paredes, the Texas Commissioner of Higher Education. According to a THECB press release issued on April 23, 2008, "Paredes based the recommendation on two considerations: 1) that ICR failed to demonstrate that the proposed degree program meets acceptable standards of science and science education; and 2) that the proposed degree is inconsistent with Coordinating Board rules which require the accurate labeling or designation of programs ... Since the proposed degree program inadequately covers key areas of science, it cannot be properly designated either as 'science' or 'science education.'"

At the committee meeting, the *Dallas Morning News* (2008 Apr 23) reported, Paredes said, "Evolution is such a fundamental principle of contemporary science it is hard to imagine how you could cover the various fields of science without giving it the proper attention it deserves as a foundation of science." "In insisting on a literal interpretation of biblical creation," Paredes added, the ICR's science education program "gives insufficient coverage to conventional science and does not adequately prepare students in the field of science education." Before the vote, the newspaper reported, "the board heard comment from several persons, most of whom urged rejection of the proposal. Among them was Steven Schafersman, president of Texas Citizens for Science (TCfS), who said the ICR was a Christian ministry rather than a science organization that was primarily interested in promoting pseudoscience." (A copy of Schafersman's testimony is available on-line at <http://www.texscience.org/documents/thecb-april2008-testimony. htm>.)

The *Austin American-Statesman* (2008 Apr 24) editorially applauded the board's decision, writing, "We applaud the board for setting this precedent in what will surely be a long series of battles involving science education in Texas. After the wars over the teaching of both evolution and intelligent design that have splintered Kansas for the past nine years, Texans can breathe at least a momentary sigh of relief. ... Paredes and the coordinating board took a correct and principled stand in denying the creationist institute's science course." Also offering plaudits was TCfS's Steven Schafersman, who told the *American-Statesman* (2008 Apr 24) that Paredes's recommendation was "very strong and courageous." Similarly, describing the recommendation to the *Texas Observer*'s blog (2008 Apr 23), he said that it was a "decisive and strong decision based on sound reasoning."

Despite the board's vote, the

Texas Academy of Sciences Adds its Voice for Evolution

In a recent statement (available on-line at <http://www.texasacademyofscience.org/scienceeducationstatement.pdf>, the Texas Academy of Sciences expressed its support for teaching evolution — which it described as "the primary unifying cognitive framework in the biological sciences" — and its opposition to including creationism (including "intelligent design") in the state's scientific curricula. The Academy's statement emphasized in particular the economic importance of science education, noting, "Modern industry requires a scientifically educated workforce. In order for Texas to remain economically competitive, it is essential that all Texans, but especially our youth[,] obtain a solid foundation in the sciences."

References in the document to the Texas Higher Education Coordinating Board and to personnel decisions at the Texas Education Agency suggest that the Academy was prompted to issue its statement by recent controversies involving evolution education in Texas, specifically the Institute for Creation Research's attempt to obtain certification in Texas for its graduate program in science education (see p 11) and the forced resignation of Chris Comer (see *RNCSE* 2008 Jan/Feb; 28 [1]: 4–7). Founded in 1892 and now boasting over 1000 members, the Texas Academy of Sciences seeks to promote scientific research among the colleges and universities of the State of Texas, to promote undergraduate research, and to enhance the professional development of its members.

issue is not definitively resolved yet. The ICR will now have 45 days to file an appeal or 180 days to reapply for a certificate of authority. After the committee's vote, the *Dallas Morning News* reported, the ICR's chief executive officer Henry Morris III "said the institute may revise its application or take its case to court. 'We will pursue due process,' he told the board. 'We will no doubt see you in the future.'" ICR's graduate school's website currently contains the explanation, "ICR is currently examining its legal options regarding how it can best serve the educational 'gaps' [*sic*] of Texas residents" (<www.icr.edu/home/>). For now, however, the ICR seems to be taking its case to the court of public opinion, issuing a series of press releases blaming "external pressure based on ideological biases" for the THECB's decision, complaining of viewpoint discrimination and *ad hominem* attacks, and bemoaning that "the state of Texas is barring some students from getting a comprehensive science education."

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BSCS Expresses Concern About Texas

In a letter (available on-line at <http://www.ncseweb.org/resources/articles/bscs_letter.pdf>) to the Texas Commissioner of Education and the members of the Texas state board of education dated February 13, 2008, the Biological Sciences Curriculum Study expressed its opposition to actions in the state of Texas that "compromise the integrity of science and the quality of science education," citing in particular the forced resignation of Chris Comer from the Texas Education Agency (see *RNCSE* 2008 Jan/Feb; 28 [1]: 4–7) and the Institute for Creation Research's bid for Texas certification for its graduate school (see p 11). "Understanding the theory of evolution is essential for teaching the biological sciences, and there is a rich body of scientific evidence in support of evolutionary theory that every biology teacher must know well," the letter stated, adding, "it is pedagogically irresponsible to remain neutral on teaching the principles of evolutionary theory, which form the cornerstone of modern biology." BSCS closed by urging the commissioner and the board to "maintain the integrity of science as you fulfill your responsibility for supporting the high quality science education that your students deserve."

The Biological Sciences Curriculum Study is a nonprofit corporation that endeavors to improve all students' understanding of science and technology by developing exemplary curricular materials, supporting their widespread and effective use, providing professional development, and conducting research and evaluation studies. Founded in 1958, BSCS was largely responsible for reintroducing evolution into the high school biology curriculum, following a four-decade period after the Scopes trial in 1925 during which evolution virtually disappeared from high school biology textbooks in the United States. As Joseph D McInerney, BSCS's executive director from 1985 to 1999, explained, "Our books put evolution back in the curriculum in the early 1960s, and we've been defending it ever since." A five-minute podcast about BSCS's role in reintroducing evolution into the high school biology curriculum, excerpted from a new documentary about BSCS, is available on the section of its website devoted to evolution (<http://www.bscs.org/ecommunity/evolution.html>), which is currently undergoing a welcome expansion.

William F Buckley Jr Dies

William F Buckley Jr, widely considered to be the father of the modern conservative movement, died on February 27, 2008, at the age of 82 in Stamford, Connecticut, according to *The New York Times*'s obituary (2008 Feb 27). Born in New York City in 1925, Buckley served in the Army from 1944 to 1946 and graduated from Yale University in 1950. In 1955, Buckley founded the magazine *National Review*, which helped to define the conservative movement. In 1966, he began to host the public affairs program *Firing Line*, airing first on WOR-TV and later on PBS; the program ran for thirty-three years and 1504 episodes. A prolific author, Buckley was first famous for his 1951 indictment of Yale's faculty, *God and Man at Yale*, and his 1954 coauthored defense of Senator Joseph McCarthy, *McCarthy and His Enemies*; among his other books are a string of spy novels featuring CIA agent Blackford Oakes. Buckley also wrote copiously for *National Review* and in his syndicated column "On the Right." He received the Presidential Medal of Freedom in 1991.

For NCSE members, Buckley will perhaps be best remembered for his participation in the *Firing Line* debate: "Resolved: The Evolutionists Should Acknowledge Creation", conducted at Seton Hall University in South Hall, New Jersey, on December 4, 1997, and moderated by Michael Kinsley. (A transcript of the debate is available on-line at <http://www.creationevolutiondebate.com>.) Buckley joined Phillip E Johnson, Michael J Behe, and David Berlinski in arguing for the affirmative, while Kenneth R Miller, Michael Ruse, NCSE's executive director Eugenie C Scott, and Barry Lynn argued for the negative. In his opening statement, Buckley retreated from the debate's title, saying, "Not everyone on the affirmative side embraces creation. What we contend is that everyone should acknowledge creation as an alternative explanation for cosmic and biological happenings now thought by so many as naturalist in providence and momentum," but continued, "my colleagues and I judge that the evidence for the naturalist theory of evolution is not merely insubstantial, it is fanciful." As the debate proceeded, however, it remained unclear what Buckley's objections to evolution were and what indeed he thought evolution was.

UPDATES

Alabama: House Bill 923, introduced in the Alabama House of Representatives by David Grimes (R–District 73) on April 24, 2008, and referred to the Education Policy Committee, was the latest in a string of "academic freedom" bills aimed at undermining the teaching of evolution in Alabama. Previous such bills — HB 391 and SB 336 in 2004; HB 352, SB 240, and HB 716 in 2005; HB 106 and SB 45 in 2006 — have failed to win passage. In 2004, a cosponsor of SB 336 told the *Montgomery Advertiser* (2004 Feb 18), "This bill will level the playing field because it allows a teacher to bring forward the biblical creation story of humankind." The bill died in committee on May 19, 2008, when the legislative session ended.

Arizona: A controversial bill in the Arizona legislature is not going to affect the teaching of evolution, according to its lead sponsor. If enacted, House Bill 2713, dubbed the Students' Religious Liberties Act, would require public educational institutions in the state not to "discriminate against students or parents on the basis of a religious viewpoint or on the basis of religious expression." But neither evolution nor science in general is specifically mentioned in the bill, and its lead sponsor, Representative Doug Clark (R–District 6), explained to the *Arizona Daily Star* (2008 Mar 18) that "students asked to detail the theory of evolution could not avoid the assignment by simply saying they believe in the biblical story of creation. But Clark said a student asked to write an assignment of personal beliefs about the origin of the species could not be marked down simply for writing about how the world was created in six days." The bill passed the House of Representatives on March 24, 2008. The Senate Education Committee passed it on April 2, 2008, and sent it to the Senate Rules Committee, where it remains.

California: The defendants in the ongoing case *Association of Christian Schools International et al v Roman Stearns et al* won a legal victory when their motion for partial summary judgment was granted, and the plaintiffs' motion for summary judgment was denied, on March 28, 2008. The plaintiffs — the Association of Christian Schools International, the Calvary Chapel Christian School in Murrieta, California, and a handful of students at the school — are charging the University of California system and a number of its employees with violating the constitutional rights of applicants from Christian schools whose high school coursework is deemed inadequate preparation for college. The ruling establishes only the constitutionality of the UC system's policies and statements regarding evaluating the qualifications of applicants for admission. To be resolved at trial is whether those policies and statements were properly and fairly applied to the specific decisions cited in the lawsuit. (For background about the case, see *RNCSE* 2005 May–Aug; 25 [3–4]: 12–3.)

A March 31, 2008, press release from the University of California system summarized the ruling:

> UC moved for partial summary judgment on the basis that ... its review policies and the position statements are constitutional exercises of the University's right to evaluate the qualifications of applicants for admission. The Court agreed, holding that the University has a legitimate interest in evaluating the adequacy of high school courses to prepare students for study at UC; that its process for doing so is reasonable; that the University's academic standards are also reasonable and do not discriminate against religion; that the position statements are a reasonable application of those academic standards; and that the University accommodates religious school students in various ways. The University did not move for summary judgment on plaintiffs' challenges to several specific course approval decisions. The Court did, however, reject plaintiffs' motion seeking judgment on those "as applied" claims, which remain for trial.

Creationism is not the only issue in the case, but it was discussed in passing in several sections of the ruling, three of which are noteworthy. First, Judge Otero rejected the plaintiffs' claim that the university system has a policy or well-established practice of rejecting biology courses that "contain topics such as theistic evolution, intelligent design, creation, or weaknesses of evolution," noting both that the defendants deny it and that courses using creationist biology textbooks as supplements have been approved. Second, evaluating the university system's policies and statements under the effect prong of the *Lemon* test, Judge Otero wrote, "an informed observer would be aware of the controversial nature of intelligent design and creation as scientific beliefs." Citing *McLean v Arkansas* and *Kitzmiller v Dover*, cases in which teaching "creation science" and "intelligent design" in the public schools was ruled to be unconstitutional, he continued, "No reasonable and informed observer could conclude that refusing to recognize intelligent design as science ... has the primary effect of inhibiting religion" (p 33).

Third, discussing the textbooks at issue, A Beka's *Biology: God's Living Creation* and Bob Jones University's *Biology for Christian Schools*, Judge Otero took notice of adverse opinions on the books from Barbara Sawrey, Donald Kennedy, and Francisco Ayala, but also observed, "Plaintiffs' evidence also supports Defendants' conclusion that these biology texts are inappropriate for use as the primary or sole text" (p 42), citing in particular Michael Behe, a proponent of "intelligent design" creationism. Behe wrote in a declaration for the case, "it is personally abusive and pedagogically damaging to *de facto* require students to subscribe to an idea." But, Otero noted, these textbooks are unabashedly dogmatic. *Biology for Christian*

Schools, for example, declares on its first page, "If [scientific] conclusions contradict the Word of God, the conclusions are wrong, no matter how many scientific facts may appear to back them," and "Christians must disregard [scientific hypotheses or theories] that contradict the Bible."

Kentucky, Bloomfield: In its newsletter *The Torch* (2008 Spring: 7), the ACLU of Kentucky reported on a case of "intelligent design" at a Kentucky middle school. After a member complained that a teacher at Bloomfield Middle School was using "intelligent design" material, William E Sharp wrote:

> We learned that the teacher not only incorporated Intelligent Design's critiques of Darwinism, but ... also disseminated a chart containing Intelligent Design's rationale for the earth's short existence. This chart provided a timeline that included (and dated) Noah's Ark and the biblical flood story. This teacher also provided students with a five page "fact sheet" on Intelligent Design's Model of Origins, its critique of the big bang theory, and its theory that dinosaurs co-existed with humans.

Citing "the substantial legal authority of teaching a religious doctrine within a science curriculum," the ACLU convinced the administration at the school to remove the objectionable material from the teacher's curriculum.

Massachusetts: Nathaniel Abraham's lawsuit (see *RNCSE* 2008 Jan/Feb; 28 [1]: 20–2) against Woods Hole Oceanographic Institution was dismissed on April 22, 2008. Contending that he was fired for not accepting evolution, Abraham filed suit against the research center on November 30, 2007, alleging that his rights were violated under Title VII of the Civil Rights Act of 1964 and seeking compensatory and punitive damages. In his complaint, Abraham claimed that acceptance of evolution "was in no way a *bona fide* occupational qualification of employment, was not previously mentioned or implied as a requisite of hiring, and was never listed among necessary criteria for the advertised position." But as NCSE's executive director Eugenie C Scott told the *Boston Globe* (2007 Dec 7), "It is inconceivable that someone working in developmental biology at a major research institution would not be expected to deal intimately with evolution."

The lawsuit was dismissed, the *Boston Globe* (2008 Apr 29) reported, when "US District Court Judge William G Young agreed with the institution's lawyer that the researcher did not file his lawsuit within the time frame required by law." In June 2006, Abraham filed a complaint with the Massachusetts Commission Against Discrimination, which ruled against him in April 2007, stating that there was insufficient probable cause to find that his supervisor and Woods Hole engaged in unlawful discriminatory practices. Included was this notification to Abraham: "Your lawsuit must be filed WITHIN 90 DAYS of your receipt of this notice; or your right to sue based on this charge will be lost" (emphasis in original). The defendants moved for a dismissal accordingly, but were also ready to argue that accepting well-established scientific principles relevant to the grant under which Abraham was hired, including evolution, was implicitly a requirement of employment.

Michigan: House Bill 6027, introduced in the Michigan House of Representatives on April 30, 2008, and referred to the House Committee on Education, is the very latest so-called "academic freedom" bill aimed at undermining the teaching of evolution, joining similar bills under consideration in Alabama, Florida, Louisiana, and Missouri. Contending that "the teaching of some scientific subjects, such as biological evolution, the chemical origins of life, human impact of climate change, and human cloning, can cause controversy and that some teachers may be unsure of the expectations concerning how they should present information on such subjects," the bill proposes to "provide clarification in these matters."

The bill, if enacted, would require state and local administrators "to create an environment within public elementary and secondary schools that encourages pupils to explore scientific questions, learn about scientific evidence, develop critical thinking skills, and respond appropriately and respectfully to differences of opinion about controversial issues" and "to assist teachers to find more effective ways to present the science curriculum in instances where that curriculum addresses scientific controversies" by allowing them "to help pupils understand, analyze, critique, and review in an objective manner the scientific strengths and scientific weaknesses of existing scientific theories pertinent to the course being taught."

Reacting to a previous anti-evolution bill introduced by the lead sponsor of HB 6027, John Moolenaar (R–District 98), the Michigan Science Teachers Association commented:

> A legislative mandate that includes only evolution and global warming in such an evaluation may suggest to students and the public that these theories are somehow less robust or less scientific than are other scientific theories that were not selected for mandatory evaluation, e.g., plate tectonics, atomic theory, cell theory, relativity. Such inference would be in clear contrast to the preponderance of scientific evidence supporting both of these theories and would represent a dishonest and unprofessional approach to the sciences and science education in Michigan.

A further section of HB 6027 attempts to immunize it against constitutional scrutiny: "This section only protects the teaching of scientific information, and this section shall not be construed to promote any religious or nonreligious doctrine, promote discrimination for or against a particular set of religious beliefs or nonbeliefs, or promote discrimination for or against religion or nonreligion." Significantly, however, Moolenaar previously cosponsored a bill that would have encouraged the teach-

ing of "the design hypothesis as an explanation for the origin and diversity of life" in public school science classes, as well as a previous bill that would have amended the state science standards to refer to "the theory that life is the result of the purposeful, intelligent design of a Creator."

Missouri: Missouri's House Bill 2554, introduced on April 1, 2008, would, if enacted, call on state and local education administrators to "endeavor to create an environment within public elementary and secondary schools that encourages students to explore scientific questions, learn about scientific evidence, develop critical thinking skills, and respond appropriately and respectfully to differences of opinion about controversial issues, including such subjects as the teaching of biological and chemical evolution," and to "endeavor to assist teachers to find more effective ways to present the science curriculum where it addresses scientific controversies." "Toward this end," the bill continues, "teachers shall be permitted to help students understand, analyze, critique, and review in an objective manner the scientific strengths and scientific weaknesses of theories of biological and chemical evolution."

In 2004, the sponsor of HB 2554, Representative Robert Wayne Cooper (R–District 155), introduced two bills, HB 911 and HB 1722, that called for equal time for "intelligent design" in Missouri's schools. HB 911 moreover would have provided that "Willful neglect of any elementary or secondary school superintendent, principal, or teacher to observe and carry out the requirements of this section shall be cause for termination of his or her contract," a draconian provision that was absent from HB 1722. Both bills failed. In 2006, Cooper introduced a third bill, HB 1266, which would have provided that "If a theory or hypothesis of biological origins is taught, a critical analysis of such theory or hypothesis shall be taught in a substantive amount." Like HB 911 and HB 1722, HB 1266 ultimately failed, although it passed by a 7–6 vote by the House Elementary and Secondary Education Committee.

Northern Marianas, Saipan: The young-earth creationist ministry Answers in Genesis is expressing interest in building a creationist "museum" in Saipan, the largest island and capital of the United States Commonwealth of the Northern Marianas Islands. According to the *Marianas Variety* (2007 Nov 6), "Last week, the Answers in Genesis Group led by its president and founder Dr Ken Ham met with Gov Benigno R Fitial and Press Secretary Charles P Reyes Jr who said the administration supports AiG's proposal." Christian Wei, the president of Eucon International College, a Saipan-based unaccredited Christian college, told the *Variety*, "We are planning to combine the Creation Museum and camp together so that we can serve the public and tourists," adding, "Many people desire entertainment so we need to provide that to attract tourists, help the economy here and also to promote the idea of Creationism." Answers in Genesis opened a new $27-million edifice in northern Kentucky in 2007; see *RNCSE* 2007 Jan–Apr; 27 (1–2): 21–4 for Tim Heaton's account of his visit there.

Ohio, Mount Vernon: Creationism is in the background in a case involving a teacher's display of religious items in his classroom. John Freshwater, a teacher at Mount Vernon Middle School, is in the news for refusing to remove his personal Bible from his classroom desk, although he complied otherwise with a directive from his principal to remove all religious items (including posters with Bible verses) from his classroom, and he is becoming a poster child for the radical religious right. Meanwhile, he is also "accused of conducting a religious 'healing session' during school and burning crosses onto students' arms," according to the *Columbus Dispatch* (2008 Apr 22): the school district is hiring an independent investigator to examine these allegations.

The *Dispatch* (2008 Apr 18) reported that it was not the first clash over his religious advocacy: "In one class, Freshwater used Lego pieces to describe the beginning of the world. He dumped the pieces, then asked students if the Legos could assemble by themselves, said Joe Stuart, 18, assistant editor of the high-school newspaper. ... In 2006, he was instructed to remove from his curriculum a handout titled 'Darwin's Theory of Evolution — The Premise and the Problem.' A parent had questioned its validity and use in a science classroom. The superintendent said it had 'not passed the test of scientific review and acceptance of the established scientific community.'"

Texas: In the March 4, 2008, primary election, Pat Hardy won the Republican nomination for the District 11 seat on the Texas state board of education, with 59% of the vote. A two-term veteran of the board, Hardy was challenged for the nomination by Barney Maddox, a urologist from Cleburne, Texas, who told the board in 2003 that the state standards were trying to "brainwash our children into believing in evolution" and who is billed by the Institute for Creation Research as "author of the biological sciences course material for the Creationist Worldview distance education program." The Associated Press (2008 Mar 5) reported, "Hardy said her opponent kept his evolution views out of campaign mailings but did tell social conservatives he would vote with them. 'They could have taken a chance and pushed some of those buttons,' Hardy said."

The race was particularly important for the integrity of science education because, as the Texas Freedom Network explains in its recent valuable report *The State Board of Education: Dragging Texas Schools into the Culture Wars* (available on-line via <http://www.tfn.org>), the far-right faction on the state board of education now holds seven seats on the fifteen-member board. The addition of Maddox would have ensured a reliable majority for the faction, which already is expected to launch a campaign aimed at undermining the treatment of evolution in the Texas state science standards as they are reviewed and revised in 2008. The state science standards determine both what is taught in Texas's public school science classrooms and the content of the biology textbooks approved for use in the state, which is one of the largest textbook markets in the country.

[*NCSE thanks Daniel Phelps for information used in this article.*]

Critical Analysis for Real

Andrew J Petto

Throughout the country, legislators are being asked to introduce and pass "academic freedom" bills, supposedly to counteract "biased" and "dogmatic" teaching of "controversial" topics. Anyone familiar with the history of creationism in this country will immediately recognize this approach as the spawn of the old "let them hear both sides and then decide for themselves" argument. After all, the reasoning goes, it is only *fair* to give students all the facts. How else can they learn to practice "critical thinking", proponents say, if they never hear the other side to controversial issues?

Of course, the real goal is to produce a generation of students who *cannot* practice critical thinking because they do not learn to distinguish between real and manufactured controversies. So the "freedom" in "academic freedom" bills is really just the freedom to deceive. Part of the reason that these arguments resonate with the public (and their representatives), of course, is the appeal to "fairness" and our society's ideal that everyone has a right to be heard. The other reason for their success is that the bill's legislative supporters often do not understand the material they are promting. They only know that they (or their constituents) are uncomfortable with certain conclusions, models, or theories in the sciences and that somebody is claiming that there is "scientific" evidence that challenges the current consensus. So how do students learn to distinguish between arguments or positions that deserve merit and those that do not — especially when they (or even their teachers) do not have the expertise or background necessary to evaluate the scientific basis of various challenges?

Real Critical Analysis

There are two main strategies to help students and teachers to evaluate claims that certain topics deemed "controversial" deserve a place at the table. Both of these look beyond the *facts* being presented and ask students and teachers to examine them in context.

The first helps to *locate* the "controversy": are the challengers inside or outside of the relevant disciplines whose consensus they are challenging? The "academic freedom" bills (and the failed Santorum Amendment) specifically focus on issues that social conservatives find disagreeable, not on the success of scientific models. Their opposition to these issues is not based on reasoned scientific dissent, but on other non-scientific objections. Their "evidence" consists of quote mining of current research or repetition of old scientific challenges that have been resolved within the scientific community. Frequently, minor disagreements within disciplines about method, analysis, or interpretation are cast as a fundamental crisis threatening the whole discipline.

Lockwood (1996) proposed a classroom strategy for helping students evaluate such controversies. His approach is to separate the discipline-specific parts of a controversy from the sociocultural parts. The discipline-specific part can be studied (and resolved) by applying the tools and methods of relevant scholarly disciplines. So it is appropriate for students to ask what research is being done and in which disciplines. Lockwood warns, however, that issues that fall into the sociocultural and political spheres can *never* be settled by discipline-based research, since they are not subject to resolution by "disciplined inquiry", but instead are related to values, traditions, and ideals that come from outside the realm of scholarly inquiry.

Consider the Source

The second is something called a "rhetorical analysis" — a procedure we teach students looking for resources for writing scientific papers (Penrose and Katz 2004). This allows students to evaluate the relevance of "evidence" presented in a source even when they lack the expertise to evaluate the discipline-specific infomation (such as research methods, technical literature, or mathematical models).

Rhetorical analysis helps students to examine the form and format of the material. This includes how the materials are organized, the level of technical vocabulary, the style and types of citation, and the form and style of the conclusions. Are data or analyses presented in tables or charts? Are sources of information identified and adequately cited? Does the source discuss the contributions of the materials cited, or just excerpt a quote and state the conclusion?

In addition, a rhetorical analysis examines the publication in which the material appears. Who is the publisher and who is the intended audience? What other materials does this publisher produce and for whom? Is there a mission statement for the publisher and/or the owner? Is the source affiliated with a specific organization, and what is that organization's mission? Who are the members?

Deflating Claims

Even when students do not understand the technical basis of the arguments and evidence, they can use these two approaches to judge the merits of these challenges to consensus information. This process also makes it abundantly clear that the evidence and challenges to evolutionary science presented by "intelligent design" differ from the classics of "creation science" only in the euphemisms that they use to describe the "problem" they see with evolution and their solutions to it.

References

Lockwood AL. 1996. Controversial issues: The teacher's critical role. *Social Education* 60 (1): 28–31.

Penrose AM, Katz SB. 2005. *Writing in the Sciences,* 2nd ed. Upper Saddle River (NJ): Pearson Longman.

A rhetorical analysis guide for students is available on-line at <http://www.uwm.edu/~ajpetto/Rhetorical.htm> and a collection of resources for teaching critical thinking is available on-line at at <http://www.uwm.edu/~ajpetto/Critical.htm>.

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Dreaming of a White Kitzmas

In the heat of the summer, it's restful to think back to the cool of winter. And what was cooler in the winter of 2005 than the release of the decision in *Kitzmiller v Dover*, the first case to address the constitutionality of teaching "intelligent design" in the public schools? The decision was scathing, both about the scientific credibility of "intelligent design" (which the judge wrote "is not science and cannot be adjudged a valid, accepted scientific theory") and about the behavior of the defendants (whom the judge castigated for "breathtaking inanity" in adopting the objectionable policy). Helping to make the case for the plaintiffs were six expert witnesses — three of them members of NCSE's board of directors — and helping to make the proceedings accessible to the general public were four talented reporters. A sampling of their books are now available through the NCSE web site: <http://www.ncseweb.org/store.asp> — look in the "In the latest *RNCSE*" section. And remember, every purchase benefits NCSE!

Illustration by Dave Smith, used with permission of the University of California Museum of Paleontology.

From the Trial

40 Days and 40 Nights
by Matthew Chapman
A series of personal vignettes from the *Kitzmiller* trial from the author of *Trials of the Monkey* (reviewed in *RNCSE* 2001 May–Aug; 21 [3–4]: 38–9). Reviewing the book for *Nature*, Kevin Padian wrote, "The author of *40 Days and 40 Nights*, Matthew Chapman, is a great-great-grandson of Charles Darwin; his presumed vested interest in the proceedings is tempered by his own history as a school dropout, a movie screenwriter and a Brit with a perpetually bemused view of colonial antics. Still, his odyssey is a fulfilling one, and he seems genuine enough to get himself invited into many homes where insights and passions run deep."

Monkey Girl
by Edward Humes
"With its title taken from a taunt aimed at a Dover student interested in learning about evolution," wrote NCSE deputy director Glenn Branch in *BioScience*, "*Monkey Girl* ... abounds in detail, critically assessed and cogently assembled. Particularly impressive are the thorough account of the events in Dover that precipitated the case and the detailed report of the preparations and maneuvers undertaken by the competing legal teams before the trial. When Humes arrives at the trial — not until the 13th chapter of his book — he continues to provide a fluent and accurate narrative, offering insightful comments on the effectiveness of the witnesses and attorneys."

The Devil in Dover
by Lauri Lebo
From the publisher: "Lauri Lebo, a small-town reporter who covered the trial, knows not just the legal case and science, but the people on all sides of the divisive battle. ... Lebo follows the story through its surprising twists, pondering whether this was a national war playing out in a small town or a small-town political battle playing out on the national stage. As a 'local girl' with a fundamentalist Christian father, Lebo provides an account that is both fascinating and moving, as she thoughtfully probes one of America's most divisive cultural conflicts — and the responsibility journalists have when covering such a controversial story."

The Battle Over the Meaning of Everything
by Gordy Slack
Andrea Barrett, writing in *Evolution: Education and Outreach*, praised Gordy Slack's *The Battle Over the Meaning of Everything* for introducing the debate "in such an approachable, conversational fashion that even the reader with no background in the area will be drawn into the drama," adding, "Slack has a good reporter's instinct for the telling detail and the vivid image, and he is able to synthesize and bring fresh perspective to a great deal of material, opening up the field for the less experienced reader. ...This book made me *curious*; it made me want to dig more deeply."

Understanding Creationism

Creationism's Trojan Horse: The Wedge of Intelligent Design
Barbara Forrest and Paul R Gross
The definitive exposé of the "intelligent design" movement's so-called Wedge strategy, *Creationism's Trojan Horse* — in Steven Pinker's words — "documents the disturbing movement to sneak religious dogma back into science education, driven by the vague fear that Americans can't handle the truth. Educators, scientists, and politicians would do well to understand this movement and its tactics, and this book is a superb and timely analysis." The paperback edition contains a new chapter on *Kitzmiller v Dover*, in

<http://www.ncseweb.org/bookstore.asp>

which Forrest, a member of NCSE's board of directors, testified for the plaintiffs, as well as a foreword from Americans United for Separation of Church and State's Barry Lynn.

Tower of Babel
by Robert T Pennock
The earliest comprehensive treatment of the "intelligent design" movement, *Tower of Babel* was praised by Frederick Crews in *The New York Review of Books* as "... comprehensive and consistently rational ... the best book opposing creationism in all of its guises" and by Evan B Hazard in *Choice* as "[e]ssential reading for all social and natural scientists (especially secondary and college teachers), and also concerned pastors, seminarians, and seminary professors." Pennock, a member of NCSE, is Professor of Philosophy at Michigan State University and editor of *Intelligent Design Creationism and its Critics*; he testified for the plaintiffs in *Kitzmiller v Dover*.

Intelligent Design Creationism and Its Critics
edited by Robert T Pennock
The publisher writes that Pennock's anthology on intelligent design creationism (IDC) "contains articles previously published in specialized, hard-to-find journals, as well as new contributions. Each section contains introductory background information, articles by influential creationists and their critics, and in some cases responses by the creationists. The discussions cover IDC as a political movement, IDC's philosophical attack on evolution, the theological debate over the apparent conflict between evolution and the Bible, IDC's scientific claims, and philosopher Alvin Plantinga's critique of naturalism and evolution. The book concludes with Pennock's 'Why Creationism Should Not Be Taught in the Public Schools.'"

Only a Theory
by Kenneth R Miller
From the publisher: "In *Only a Theory*, Kenneth Miller dissects the claims of the ID movement in the same incisive style that marked his testimony as an expert witness in Pennsylvania's landmark 2005 Dover evolution trial. ... *Only a Theory*'s critique of ID goes far beyond the scientific claims of the movement. To Miller, America's 'soul' — its place as the world's leading scientific nation — is at risk because of this struggle. ... Miller refuses to play the role of pessimist. He sees this as a teachable opportunity, a moment at which public understanding and support for science can be redeemed."

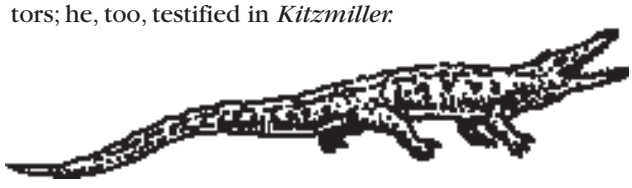
Beyond the Trial: Education, Faith, and Dinosaurs

Defending Evolution in the Classroom
Brian J Alters and Sandra M Alters
Defending Evolution in the Classroom is a necessity for anyone concerned with evolution education. The late Ernst Mayr wrote, "This book should be in the hands of every educator dealing with the subject of evolution," and Eugenie C Scott, executive director of NCSE, agreed: "At last a book for teachers to help them cope with anti-evolutionism. Clearly written and filled with practical advice about the underlying religious and scientific issues prompting student questions, *Defending Evolution* should be on every teacher's bookshelf." A member of NCSE's board of directors who testified in *Kitzmiller*, Brian J Alters directs the Evolution Education Research Centre at McGill University.

Responses to 101 Questions on God and Evolution
by John F Haught
From the author of *God after Darwin* and *Deeper than Darwin* comes *Responses to 101 Questions on God and Evolution*, which distills his insights in a convenient question-and-answer format. "Too much time and energy is wasted trying to show that evolution is wrong," Haught writes, "when religious believers should be asking whether our understanding of God might not be too small to accommodate Darwin's world." Phina Borgeson wrote in *RNCSE*, "for those who want the fruits of reasoned thinking on evolution and Christian theology that may be mined for succinct answers, this is the book of choice." Haught, who testified in *Kitzmiller*, is Landegger Distinguished Professor of Theology at Georgetown University.

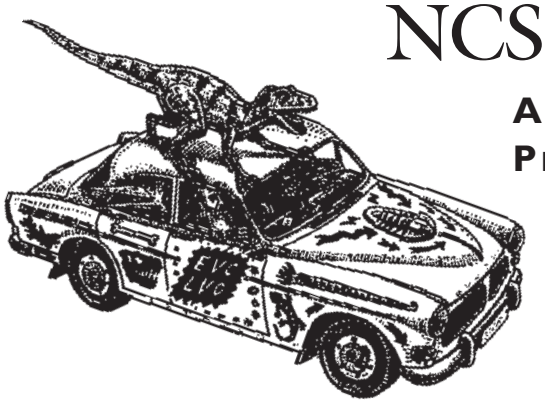
Finding Darwin's God
by Kenneth R Miller
Subtitled "A scientist's search for common ground between God and evolution," *Finding Darwin's God* is a perennial favorite. Francisco J Ayala writes, "*Finding Darwin's God* is an artfully constructed argument against both those who deny evolution and those using science to justify a materialist worldview. Yet it is a book for all readers. I know of no other that would surpass it in being mindful of different views, while still forceful. Miller has an uncanny gift for expressing profound ideas in clear and graceful prose." The author, who testified in *Kitzmiller*, is Professor of Biology at Brown University and a Supporter of NCSE.

Encyclopedia of Dinosaurs
edited by Philip J Currie and Kevin Padian
Compiled by two of the world's foremost dinosaur experts, with almost 900 pages by 275 authors and 35 color plates, *Encyclopedia of Dinosaurs* was hailed as the most valuable and up-to-date reference work on dinosaurs when it was published in 1997. NCSE's executive director Eugenie C Scott applauded, "I know *I'm* going to get a lot of use out of this book, and so would any teacher or parent with a dinosaur-nutty kid." Editor (and contributor) Kevin Padian, a paleontologist at the University of California, Berkeley, is president of NCSE's board of directors; he, too, testified in *Kitzmiller.*



NCSE on the Road

A Calendar of Special Events, Presentations, and Lectures



Date July 21, 2008
City Madison WI
Presenter Andrew J Petto
Title Sex on the Brain: Why We Differ
Event Keynote address for the "Boys and Girls at Risk: The Emerging Science of Gender Differences" conference
Time 10:30 AM
Location Madison Concourse Hotel
Contact Chris Dunleavy, cdunleavy@dcs.wisc.edu, 608-265-4267

Date August 14, 2008
City Manitowish Waters WI
Presenter Andrew J Petto
Title Evolutionary Science: Springboard to Living in Nature
Event Presentation in Nibbles 'n Knowledge series
Time 6:00 PM
Location North Lakeland Discovery Center
Contact Maggie Ortlieb, maggie@discoverycenter.net, 715-543-2085

Date August 21, 2008
City Chautauqua NY
Presenter Eugenie C Scott
Title TBA
Event Darwin, Linnaeus, and Their Impact on Our View of the Natural World program
Time 2:00 PM
Location Chautauqua Institution
Contact Maureen Novengo, mrovengo@ciweb.org

Date September 11, 2008
City Oxford OH
Presenter Eugenie C Scott
Title Science and Religion as Ways of Knowing
Event Science, Evolution, Religion series
Time 4:30 PM
Location Hall Auditorium, Miami University of Ohio
Contact Mary Jane Berman, falkeda@muohio.edu

Date Sep 16, 2008
City Boone NC
Presenter Eugenie C Scott
Title Why Darwin Matters
Event Public lecture in Darwin series
Time 7:00 PM
Location Appalachian State University
Contact Howie Neufeld, neufeldhs@appstate.edu

Check the NCSE web site for updates and details — <http://www.ncseweb.org/meeting.asp>.

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NCSE NEWS

News from the Membership

Glenn Branch, NCSE Deputy Director

From time to time we like to report on what our members are doing. As the following list shows, they — and we — have a lot to be proud about!

NCSE Supporter **Bruce Alberts**, NCSE's deputy director **Glenn Branch**, and **Kevin Padian**, president of NCSE's board of directors, were interviewed by *Geotimes* (2008 Mar: 47) about the new publication from the National Academy of Sciences and the Institute of Medicine, *Science, Evolution, and Creationism* (see *RNCSE* 2008 Jan/Feb; 28 [1]: 14). Commending the publication's treatment of religious issues, Branch commented, "A lot of people labor under the misapprehension that evolution is antireligious," adding that *Science, Evolution, and Creationism* may help to convince "the mushy middle" of Americans who, although not diehard fundamentalists, still harbor uncertainties about evolution. Alberts, past president of the National Academy of Sciences, was quoted as saying, "This publication is a tool, but it's only a very small start in getting scientific societies and scientists mobilized in thinking about how science is taught." And Padian stressed the role of earth scientists in doing so, saying, "We don't need to throw more fruit fly genetics at [creationists]; it doesn't go anywhere." What is needed, he explained, is a careful explanation of the major changes in the fossil record (such as he provided in his testimony in *Kitzmiller v Dover* — see the recommendations in his oped in the February 2008 issue of *Geotimes*, discussed in *RNCSE* 2008 Jan/Feb; 28 [1]: 22–7).

NCSE Supporter **Francisco J Ayala** was profiled by *The New York Times*'s Cornelia Dean (2008 Apr 29) as "Roving defender of evolution, and of room for God." The profile focused on his busy schedule speaking "in defense of the theory of evolution and against the arguments of creationism and its ideological cousin, intelligent design," quoting NCSE's executive director **Eugenie C Scott** as saying, "When Francisco speaks, people listen." Noting his irenic attitude toward religion, she added, "creationists always showcase the religion-bashers in science as if they speak for all scientists. They clearly do not speak for Francisco and many others." Ayala dismissed the argument that it is only fair to teach creationism along with creationism, saying, "We don't teach alchemy along with chemistry ... We don't teach witchcraft along with medicine. We don't teach astrology with astronomy." Ayala is the Donald Bren Professor of Biological Sciences at the University of California, Irvine, and the author most recently of *Darwin's Gift* (Washington [DC]: Joseph Henry Press, 2007).

"No victory in the textbook wars in sight", by NCSE's deputy director **Glenn Branch**, was published in *Skeptic* (2008; 14 [1]: 10), responding to a previous story in *Skeptic* (13 [4]: 15) in which L Kirk Hagen declared victory for evolution in the textbook wars. Citing a number of recent incidents, including the forced resignation of Chris Comer and the attacks on the place of evolution in Florida's state science standards, Branch wrote, "Hagen ... may be right that [creationists] face a Sisyphean task in the foreseeable future. But Sisyphus, for all that his task was pointless and interminable, persevered, and creationists will, too, with the strategies and tactics continuing to evolve along the way." Also of interest in the same issue of *Skeptic* are Tim Callahan's reviews of **Donald R Prothero**'s *Evolution: What the Fossils Say and Why it Matters* (66–7) and Dinesh D'Souza's *What's So Great About Christianity?* (68–72), which comments that "D'Souza's own knowledge of evolutionary science is quite suspect," and **Norman Levitt**'s review of Steve Fuller's *Science v Religion? Intelligent Design and the Problem of Evolution* (73–7), with a rejoinder by Fuller (77–8) and a surrejoinder by Levitt (78–9).

"A reassessment of prebiotic organic synthesis in neutral planetary atmospheres," by H James Cleaves, **John H Chalmers**, Antonio Lazcano, the late Stanley L Miller, and Jeffrey L Bada, was published in *Origins of Life and Evolution of the Biosphere* (2008) 38: 105–115. The abstract:

> The action of an electric discharge on reduced gas mixtures such as H_2O, CH_4 and NH_3 (or N_2) results in the production of several biologically important organic compounds including amino acids. However, it is now generally held that the early earth's atmosphere was likely not reducing, but was dominated by N_2 and CO_2. The synthesis of organic compounds by the action of electric discharges on neutral gas mixtures has been shown to be much less efficient. We show here that contrary to previous reports, significant amounts of amino acids are produced from neutral gas mixtures. The low yields previously reported appear to be the outcome of oxidation of the organic compounds during hydrolytic workup by nitrite and nitrate produced in the reactions. The yield of amino acids is greatly increased when oxidation inhibitors, such as ferrous iron, are added prior to hydrolysis. Organic synthesis from neutral atmospheres may have depended on the oceanic availability of oxidation inhibitors as well as on the nature of the primitive atmosphere itself. The results reported here suggest that endogenous synthesis from neutral atmospheres may be more important than previously thought.

Via e-mail, Chalmers explained:

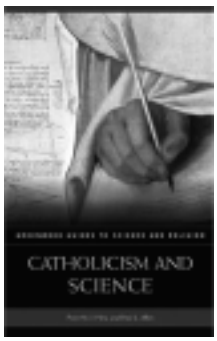
> Our lab has recently repeated the Miller-Urey experiment with model atmospheres consisting of CO_2, N_2[,] and water vapor. These conditions are redox neutral to slightly

oxidizing and are similar to what some investigators think obtained on the primitive earth and early Mars. We feel that these experiments show that amino acid synthesis can take place under such conditions as well as under more reducing ones and thus that the major creationist objection to the significance of the original M-U experiment has been answered. M-U chemistry works regardless of the exact conditions obtaining on the primitive earth.

In March 2008, **Lorence G Collins** gave separate presentations on scientific evidence against creationism to two diverse audiences: the staff and docents at the Los Angeles County Natural History Museum, and his United Methodist church. In both presentations, he focused on four topics: polonium haloes as false indicators of instant creation; the age of the earth as indicated by chlorine ions in the oceans (see his article in *RNCSE* 2006 Sep/Oct; 26 [5]: 16–8, 23–4; available on-line at <http://www.csun.edu/~vcgeo005/collins.pdf>); Noah's Flood; and the Bible as a false guide to medical science. Collins is Professor Emeritus of Geological Sciences at California State University, Northridge.

Taner Edis's *Science and Nonbelief*, originally published as part of the Greenwood Guides to Science and Religion series (Westport [CT]: Greenwood Press, 2005), was republished, with a new preface, in softcover (Amherst [NY]: Prometheus Books, 2008). In his new preface, Edis writes, "Since the hardcover edition of *Science and Nonbelief* appeared in 2006, friction between science and supernatural beliefs has continued to generate public controversy," citing both the perseverance of the "intelligent design" movement after *Kitzmiller v Dover* and a spate of "aggressively atheistic books" in which "the role of science ... appears to be secondary." Edis teaches physics at Truman State University, is the associate editor of *RNCSE* for physics, and is the author of *The Ghost in the Universe* (Amherst [NY]: Prometheus Books, 2002; reviewed in *RNCSE* 2003 Jan/Feb; 23 [1]: 29–30), which won the Morris D Forkosch award for the best secular humanist book of 2002.

NCSE's Faith Project Director **Peter MJ Hess** and Paul L Allen's book *Catholicism and Science* was published (Westport [CT]: Greenwood Press, 2008). The publisher writes, "When most people think about Catholicism and science, they will automatically think of one of the famous events in the history of science — the condemnation of Galileo by the Roman Catholic Church. But the interaction of Catholics with science has been — and is — far more complex and positive than that depicted in the legend of the Galileo affair. Understanding the natural world has always been a strength of Catholic thought and research — from the great theologians of the Middle Ages to the present day — and science has been a hallmark of Catholic education for centuries. *Catholicism and Science*, a volume in the Greenwood Guides to Science and Religion series, covers all aspects of the relationship of science and the Church: [h]ow Catholics interacted with the profound changes in the physical sciences ('natural philosophy') and biological sciences ('natural history') during the Scientific Revolution; [h]ow Catholic scientists reacted to the theory of evolution and their attempts to make evolution compatible with Catholic theology; [t]he implications of Roman Catholic doctrinal and moral teachings for neuroscientific research, and for investigation into genetics and cloning. The volume includes primary source documents, a glossary and timeline of important events, and an annotated bibliography of the most useful works for further research."



NCSE Supporter **Kenneth R Miller** spoke on "God, Darwin, and Design: Lessons from the Dover Monkey Trial" on April 4, 2008, at the University of Texas, Austin — and his talk is now available on-line via <http://www.esi.utexas.edu/outreach/ols/lectures/Miller/>. (It is necessary to download a small plug-in to view the webcast.) A Supporter of NCSE, Miller was a scientific expert witness for the plaintiffs in *Kitzmiller v Dover*, the 2005 case establishing the unconstitutionality of teaching "intelligent design" creationism in the public schools. He is Professor of Biology at Brown University, the coauthor of the most widely used high school biology textbook in the United States, and the author of *Finding Darwin's God* (New York: Harper Perennial, 2007) and the forthcoming *Only a Theory: Evolution and the Battle for America's Soul* (New York: Viking, 2008).

Kevin Padian, the president of NCSE's board of directors, was quoted in "Young, Asian American, and Christian," the cover story of the alternative weekly *East Bay Express* (2008 Apr 2–9; 30 [26]: 11–6). A section of the story dealt with science/faith issues among Asian-American students at the University of California, Berkeley, where Padian is a professor of integrative biology and curator at the Museum of Paleontology. He told the newspaper that students who do not believe in evolution usually do not identify themselves: "I think the general pattern is that students don't make a big deal out of this in their classes — for several reasons: they don't feel it's relevant, or you teach my science and I'll believe what I want to believe." He emphasized the importance of their understanding evolution, however, commenting, "Without a knowledge of evolution, antibiotics would make no sense; im[m]unology would have no basis. ... We could not explain anything in the history of geology or of life on earth; comparative anatomy would make no sense; neither would embryology, physiology, or virtually any other area of biology and related sciences."

NCSE's **Joshua Rosenau** and **Eugenie C Scott** collaborated to write "Florida science standards evolve" for *NSTA Reports* (2008 Mar 24; available on-line at

<http://www3.nsta.org/main/news/stories/nsta_story.php?news_story_ID=54723>), a publication of the National Science Teachers Association. "'The scientific theory of evolution is the fundamental concept underlying all of biology and is supported by multiple forms of scientific evidence.' With those words, the new Florida science education standards, adopted on February 19, give Florida's teachers a clear mandate to present evolution for the first time," they wrote. "The inclusion of evolution in the new standards did not come without a struggle, during which the word 'theory' became almost as controversial as the teaching of evolution itself." Ultimately, however, the standards were adopted (see p 4 for Rosenau's account). And now "Florida's students, teachers, and citizens can be proud that the Sunshine State Standards — like teachers and scientists — now beam on evolution."

Joshua Rosenau

The Episcopal Network for Science, Technology, and Faith named **Robert J Schneider** as the recipient of its Genesis Award for 2008. According to Episcopal Life Online (2008 Apr 25), "Schneider was recognized for his work as lead author of *A Catechism of Creation*, a pioneering resource for science-based creation theology. 'Bob has always been a genial mentor in ecumenical dialogues on science, technology and faith,' said Sandra Michael, chair of the Network, 'especially through interpreting creationism and helping Episcopalians deal with the specious arguments of Intelligent Design.'" A professor emeritus at Berea College, Schneider now teaches biblical literature at Appalachian State University in Boone, North Carolina, and maintains his own science-and-faith website at <http://community.berea.edu/scienceandfaith>; *A Catechism of Creation* is available on-line as a PDF at <http://www.episcopalchurch.org/documents/CreationCatechism.pdf>.

NCSE's executive director **Eugenie C Scott** received the UCSF Medal, the highest award of the University of California, San Francisco, on April 23, 2008. In a letter to Scott, the university's chancellor J Michael Bishop wrote, "The award is offered in recognition of your distinguished advocacy on behalf of science in the public arena. The UCSF Medal is given in lieu of an honorary degree and is the highest honor that the campus confers." The UCSF website explains, "The UCSF Medal is an expression of recognition and appreciation by the UCSF community for individuals whose life work is consonant with UCSF's mission and whose contributions are of a scope and quality that justify the campus'[s] highest recognition."

Eugenie C Scott also received the honorary degree of Doctor of Science from the University of New Mexico on May 17, 2008. In a letter to Scott, the university's president David J Schmidly wrote, "This degree is a reflection of the high regard in which you are held and acknowledgement of the vast accomplishments you have made in your career." According to a press release (available on-line at <http://www.pandasthumb.org/archives/2008/03/unm-awards-geni.html>) posted at The Panda's Thumb blog on March 13, 2008, "The nomination, spearheaded by Professor John Geissman, now Chair of Earth and Planetary Sciences, was enthusiastically endorsed by the faculty from Earth and Planetary Sciences, Biology, and Anthropology." The letter nominating Scott for the honor said of her, "She works tirelessly and travels endlessly, to eloquently and patiently inform the citizens of the United States about issues centering on how science should be taught in the classroom and how science, which tells us how the natural world works, can be distinguished from other ways of knowing." The honorary degree was Scott's sixth; she received honorary Doctor of Science degrees from McGill University in 2003, the Ohio State University in 2005, Mount Holyoke College and the University of Wisconsin, Milwaukee, in 2006, and Rutgers University in 2007.

Eugenie C Scott

NCSE Supporter **Elliott Sober**'s new book *Evidence and Evolution: The Logic Behind the Science* was published (Cambridge: Cambridge University Press, 2008). The publisher describes it as follows:

> How should the concept of evidence be understood? And how does the concept of evidence apply to the controversy about creationism and also to work in evolutionary biology about natural selection and common ancestry? In this rich and wide-ranging book, Elliott Sober investigates general questions about probability and evidence and shows how the answers he develops to those questions apply to the specifics of evolutionary biology. Drawing on a set of fascinating examples, he analyzes whether claims about intelligent design are untestable; whether they are discredited by the fact that many adaptations are imperfect; whether it is possible to know that present species trace back to common ancestors; how it is possible to test hypotheses about natural selection, and many other issues. His book will interest all readers who want to understand philosophical questions about evidence and evolution, as they arise both in Darwin's work and contemporary biological research.

Sober is Hans Reichenbach Professor and William Vilas Research Professor in the Department of Philosophy, University of Wisconsin, Madison. His previous books include *Philosophy of Biology*, 2nd ed, (Boulder [CO]: Westview Press, 2000).

The OOPSIE Compromise – A Big Mistake

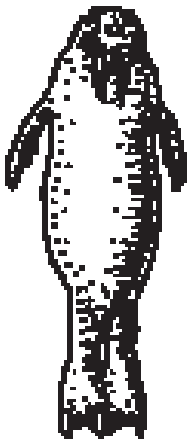
Eugenie C Scott and Glenn Branch

"Dear NCSE, I have a student whose father wants me to let his son opt out of instruction in evolution this semester. The principal says, 'Let him do genetics'. I can't have the kid do Punnett squares for four weeks! What can I do?"

"Dear NCSE, a member of our school board claims that something called the 'Hatch Amendment' requires our teachers to let students opt out of instruction in evolution. Can this possibly be true?"

"Dear NCSE, We don't have a controversial issues policy in my district, so do I have to let a student who says that learning evolution is against her religion opt out of learning about evolution?"

Here at the National Center for Science Education, we receive a steady stream of questions from parents, teachers, science supervisors, and school board members about whether to allow students to opt out of instruction in evolution. Such policies complicate science instruction, of course, and (as we argue below) they have a bad effect on the students who opt out, on their classmates whose studies are disrupted, and especially on their teachers, who cannot fulfill their duty to instruct their charges about biology without emphasizing evolution. Particularly in communities in which creationism is prevalent, allowing students to opt out is often viewed as a satisfactory compromise whereby evolution is taught in general but not inflicted on the unwilling. But is it really satisfactory?



As we use the term, opt-out policies — OOPs, for short — are policies that allow students to be withdrawn from activities at school that address topics that they or their parents consider to be offensive or otherwise inappropriate. Not included under the rubric is the practice of allowing students to choose their classes from a choice provided by the school, which might allow them to avoid offensive activities, or the practice of informally steering students who are (or whose parents are) suspected of harboring objections to certain activities to classes where they are minimized or avoided altogether, or the practice of allowing (or even encouraging) students to attend private rather than public schools in order to avoid activities that they or their parents deem offensive.

The sources of OOPs vary. Sometimes OOPs are mandated by state law. In California, for example, the law allows students in the public schools to opt out of sex education and to opt out of animal dissection when they have a moral objection to it ("Ick!" is not enough). Sometimes individual school districts or schools go beyond the demands (if any) of state law, adopting OOPs of their own, which may either be general (policies about "controversial issues" sometimes include OOPs) or refer to specific practices that are of especial concern in their communities. And sometimes, of course, students or their parents may request — or demand — permission to opt out of a particular activity, even in the absence of any formal OOP.

Few OOPs explicitly involve academic topics, but when they do, there is typically a provision that ensures that the students who are opted out will, if possible, have to engage in a substitute activity to acquire the knowledge or ability that the objectionable practice is supposed to impart. In the case of animal dissection, for example, a district may allow the use of detailed plastic models or interactive dissection software. The rationale for such provisions is both obvious and compelling: for basic academic topics, students simply need to learn the material, by hook or by crook.

Opting out of evolution

So when it comes to opt-out policies specifically including evolution — OOPSIEs — the acronym illustrates our view: because of the centrality of evolution to biology, such policies are a bad mistake. As Theodosius Dobzhansky famously wrote twenty-five years ago, "Nothing in biology makes sense except in the light of evolution" (Dobzhansky 1973). Evolution inextricably pervades the biological sciences; it therefore pervades, or at any rate *ought* to pervade, biology education at the K–12 level. There simply is no alternative to learning about it; there is no substitute activity. A teacher who tries to present biology without mentioning evolution is like a director trying to produce *Hamlet* without casting the prince. By the same token (and to vary the play), a student who is opted out of evo-

Eugenie C Scott and Glenn Branch are the executive director and deputy director, respectively, of NCSE.

lution is likely to regard biology as a tale told by an idiot, full of sound and fury, signifying nothing.

Shakespeare aside, it is not *only* students who are opted out of evolution who suffer as a result of OOPSIEs. Accommodating such students is bound to be disruptive to the course as a whole — ironically, the better the treatment of evolution in the course, the worse the disruption. A student opting out of evolution in such a course would have to bob in and out of the classroom several times a month, disappearing, for example, when the structure of the cell is taught (and with it the endosymbiotic origin of mitochondria), and again when taxonomy is taught (and with it phylogenetic systematics), and yet again when genetics is taught (and with it molecular homology), and so on. It is simply unreasonable to expect a teacher to install a revolving door, as it were, to accommodate students who are unwilling to hear the dreaded e-word.

Moreover, OOPSIEs are bad for schools and districts. Students who fail to learn about evolution are not going to perform as well on statewide examinations, which reflects poorly not only on them but also on their schools and districts. Nor are they going to perform as well in their biology classes in colleges and universities, where the faculty expects incoming students to have at least a basic grasp of evolution. Indeed, high school administrators often have to certify that the courses intended to prepare students for college in fact do so; allowing students to opt out of topics that are central to such classes may result in decertification. Schools and districts with OOPSIEs may also find it difficult to attract and retain those science teachers who take their professional responsibilities seriously: given a choice, who would prefer to teach biology at a school where the administrators are unwilling to support the teaching of evolution?

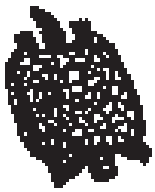
Faced with a proposed or actual OOPSIE, what is a science teacher to do? School and district administrators need to be reminded that science teachers deserve to be treated as professionals, trained in both the content of science and the methods of education; as such, their professional opinions about the necessity of including evolution in the biology curriculum deserve to be heeded. And, of course, their professional groups, such as the National Science Teachers Association, unequivocally endorse "the position that evolution is a major unifying concept in science and should be included in the K–12 science education frameworks and curricula. ... if evolution is not taught, students will not achieve the level of scientific literacy they need" (NSTA 2003). Administrators also need to be reminded of the practical repercussions of OOPSIEs: the burdens imposed on teachers, the disruptions caused to the educational process, the damages wreaked on the school's reputation.

Escape Hatch?

Claims that OOPSIEs are required by the Constitution, federal law, or state law deserve skepticism. For example, the Protection of Pupil Rights Amendment — sometimes called the "Hatch Amendment" or the "Grassley Amendment" — is occasionally claimed to require school districts to allow students to opt out of various topics, including evolution. In fact, the PPRA is limited in scope, applying only to surveys, analyses, and evaluations funded by the federal Department of Education, and is intended only to protect the privacy of parents and students with regard to such studies; it neither sets limits on the school district's control over its curriculum nor provides any right for students to be opted out from regular classes (Simpson 1996, and see sidebar, p 28). But boilerplate policy language citing the PPRA continues to circulate, dismayingly.

In dealing with individual parents who are requesting — or demanding — permission for their children to be opted out of instruction in evolution, not necessarily seeking the institution of a formal OOPSIE, different strategies are appropriate. Such parents are generally going to be conservative Christians who are worried, at bottom, about the prospect that instruction in evolution will challenge or damage their children's faith and that their children will be forced to "believe" in evolution. What helps to alleviate their concern is not a defensive citation of the importance of evolution in the curriculum or the practical repercussions for the school, but a respectful engagement with their worry.

According to teachers on the front lines, it helps to reassure such parents that the aim of education is to impart understanding, not to compel belief. As Ella Ingram and Craig Nelson (2006:20) put it, "we believe that understanding evolution is more important than accepting evolution, and indeed that, ethically, we should ask students to strive for understanding prior to making decisions regarding acceptance of any theory." Students are asked only to understand evolution and appreciate its evidential basis — not to profess a faith in evolution, much less to renounce their religious views. Indeed, even the major creationist organizations agree that students ought to learn about evolution, although they themselves misunderstand and misrepresent it.



It helps also to explain that there is a range of attitudes about evolution and religion. Although there are those who regard evolution as incompatible with or even threatening to their faith, there are also those who regard it as compatible with or even enriching their faith. Among the latter, cited in the new publication *Science, Evolution, and Creationism* (NAS 2008), are not only religious leaders like the late Pope John Paul II but also prominent scientists like Francis Collins and Kenneth R Miller, both of whom have written eloquently on evolution and their faith (Collins 2006; Miller 2007). Not all parents will share the religious views of such authors, of course; but they may be impressed enough by their sincere devotion to heed their insistence that to understand modern science, a student needs to learn about evolution.

Ultimately, parents and teachers want the same things: for their children and students to do well in school, learn the subject material, and become educated citizens. Accomplishing these goals requires that teachers ensure the competence of students in basic

subjects such as biology, to which evolution is central. That is why OOPSIEs are not a satisfactory compromise but just a big mistake.

Acknowledgments

We thank the members of NCSE's legal advisory committee, especially Ehrich Koch, for their guidance; they are of course not responsible for the views expressed here. We blame our colleague Joshua Rosenau for the reference to the Scottish play.

References

Collins FS. 2006. *The Language of God: A Scientist Presents Evidence for Belief*. New York: Free Press.

Dobzhansky T. 1973. Nothing in biology makes sense except in the light of evolution. *The American Biology Teacher* 25: 125–9.

Ingram EL, Nelson CE. 2006. Relationship between achievement and students' acceptance of evolution or creation in an upper-level evolution course. *Journal of Research in Science Teaching* 43 (1): 7–24.

Miller KR. 2007. *Finding Darwin's God: A Scientist's Search for Common Ground Between God and Evolution*. New York: Harper Perennial.

[NAS] National Academy of Sciences. 2008. *Science, Evolution, and Creationism*. Washington [DC]: National Academies Press. Available on-line at <http://www.nap. edu/sec>. Last accessed January 11, 2008.

[NSTA] National Science Teachers Association. 2003. Position Statement: The Teaching of Evolution. Available on-line at <http://www.nsta.org/about/positions/evolution.aspx>. Last accessed January 11, 2008.

Simpson MD. 1996. What's a teacher to do? *NEA Today* 14 (6): 25. Available on-line at <http://findarticles.com/p/articles/mi_qa3617/is_199602/ai_n8750005>. Last accessed January 11, 2008.

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[*Originally published in* Evolution: Education and Outreach *1 (2): 147–9.*]

What the PPRA Really Says

Ehrich Koch

A number of anti-evolution websites incorrectly advise parents that they have the right to remove their child from classes teaching evolution and other "controversial" subjects under the Protection of Pupil Rights Amendment (PPRA) (20 USC §1232h; 34 CFR Part 98). The PPRA is also referred to as the "Hatch Amendment," the "Grassley Amendment," and the "Tiahrt Amendment" after authors of amendments to the law.

The PPRA is limited in scope and does not give a parent the right to opt out of required curriculum. Instead, it is intended to protect the rights of parents and students in two ways.

First, it seeks to ensure that schools and contractors make instructional materials available for inspection by parents *if* those materials will be used *in connection with* a Department of Education funded survey, analysis, or evaluation in which children participate.

Second, it seeks to ensure that schools and contractors obtain written parental consent before minor students are required to participate in any Department of Education funded survey, analysis, or evaluation that reveals information concerning:

1. Political affiliations;
2. Mental and psychological problems potentially embarrassing to the student and his/her family;
3. Sexual behavior and attitudes;
4. Illegal, anti-social, self-incriminating. and demeaning behavior;
5. Critical appraisals of other individuals with whom respondents have close family relationships;
6. Legally recognized privileged or analogous relationships, such as those of lawyers, physicians, and ministers; or
7. Income (other than that required by law to determine eligibility for participation in a program or for receiving financial assistance under such program).

In summary, the PPRA *only* applies to a US Department of Education funded survey, analysis, or evaluation. It does not limit a school district's right to control its curriculum nor does it provide parents with the option of withdrawing their children from a required science class.

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Hacking and I

Glenn Branch, NCSE Deputy Director

Writing in the October 8, 2007, issue of *The Nation*, the philosopher Ian Hacking reviewed five books relevant to the creationism/evolution controversy: Philip Kitcher's *Living with Darwin: Evolution, Design, and the Future of Faith*, Michael Lienesch's *In the Beginning: Fundamentalism, the Scopes Trial, and the Making of the Antievolution Movement*, Michael Behe's *The Edge of Evolution: The Search for the Limits of Darwinism*, Ronald L Numbers's *The Creationists: From Scientific Creationism to Intelligent Design*, and *A Religious Orgy in Tennessee: A Reporter's Account of the Scopes Monkey Trial*, a collection of HL Mencken's contemporary reportage. (His essay is also available on-line at <http://www.thenation.com/doc/20071008/hacking>.)

Hacking began by looking on the bright side: "The anti-Darwin movement has racked up one astounding achievement. It has made a significant proportion of American parents care about what their children are taught in school." However, he subsequently observed, "The debate about who decides what gets taught is fascinating, albeit excruciating for those who have to defend the schools against bunkum." With Kitcher, he prefers to classify creationist bunkum not as bad science or pseudoscience, but as dead science — or, borrowing a term from the philosopher of science Imre Lakatos, "degenerate" science.

"Degenerate programs paint themselves into smaller and smaller corners, skirting problems they'd prefer not to face," Hacking explained. "They seldom or never have a new, positive explanation of anything. In short, they teach us nothing." In contrast, "evolutionary theory is a living, growing, vital organism ... a blooming, buzzing, confusing delight, finding out more about the world every day." He cited debates over the phylogeny of the primates and the extant of horizontal genetic transfer as cases of genuine scientific controversies within evolutionary biology.

"Contrast that with pseudo-controversy," Hacking continued, "and take, for example, Michael Behe, a professor at Lehigh University who must be the most ingenious and prolific anti-Darwinian biologist at work today." Referring to Behe's first book, *Darwin's Black Box*, he wrote, "There is no give and take of explanation and counterexample, no new methodology, no new anything — just the same old question dressed up in slightly new clothes." With respect to Behe's latest book, *The Edge of Evolution* (reviewed by David E Levin in *RNCSE* 2007 Jan–Apr; 27 [1–2]: 38–40), he concluded, "Once again, we get a recycled objection in slightly new packaging, and no new ideas. ... Can't they do better than that? Apparently not."

Hacking ended his essay on a theological note. "Intelligent design is silly," he remarked, despite its predecessors in the history of philosophy, and its central weakness is that "[i]t says nothing about the designer." Its silence about the nature of the designer, he argues, allows a number of variations on "the trite *ad hominem* observation" that the design in nature is imperfect: that the designer is evil, that the designer is insane ("obsessed with intricate details so long as they do not get too much in the way of other devices he concocts"), and — in what he described as a "more attractive thought" — that the designer chose to operate through chance and selection.

On its website, *The Nation* features web letters — "continually published replies we receive from real people, who sign their real names," it explains. Among them was mine, which was denoted with a star as an "editor's pick"; on the other hand, so was a letter from a self-described creationist, who praised Hacking "for showing the best that evolutionists can do is no threat to real science or to real faith in the living God: No intelligent creationist need fear the posturing glove puppet that is evolutionism." What follows is a lightly edited version of my letter (available on-line at <http://www.thenation.com/bletters/20071008/hacking>.)

In his generally astute review, Ian Hacking wrongly rejects the terms "anti-evolution" and "creationism" to describe those attempting to undermine the teaching of evolution in the public schools. In particular, Hacking contends, "the label 'anti-Darwin' seems the right umbrella term for creationism, anti-evolutionism — and Behe." Michael J Behe, a biochemist — not, as Hacking describes him, a biologist — is the author of *The Edge of Evolution*, one of the books under review. Neither of Hacking's reasons for his terminology is valid, and it is important for understanding the anti-evolution movement in the United States to understand why.

Hacking writes, "Behe says, in effect, 'Sure, I believe in evolution by natural selection — it just doesn't do all it is supposed to.'" But the late Henry Morris, founder of the Institute for Creation Research, and his fellow young-earth creationists also accept evolution by natural selection, if only within limits of the Biblical "kinds" (for instance, Genesis 1:25 [KJV]: "God made the beast of the earth after his kind, and cattle after their kind, and every thing that creepeth upon the earth after his kind.") Ironically, as Ronald L Numbers has observed, young-earth creationists have taken to invoking extraordinarily rapid natural selection to explain the vast amount of diversification they are forced to assume

to have occurred in the 4000 years since Noah's Flood.

Hacking also writes that Behe "does not officially argue for special acts of creation." But "irreducible complexity" is clearly intended to indicate where God miraculously intervened in the biological world. Although Behe believes that the designer is God, it is true that he and his "intelligent design" colleagues generally refrain from claiming scientific warrant for that conclusion. But it is hard to avoid the conclusion that their reticence is dictated not so much by a recognition of the limitations of their arguments as by their desire to skirt the First Amendment's ban on the advocacy of religion in public school science classrooms (see the Supreme Court's decision in the 1987 case *Edwards v Aguillard*).

"Antievolution" in the phrase "anti-evolution movement" is a metonymy; it is not evolution *per se* that creationists are fighting against but evolution education. Since Behe has actively participated in efforts to compromise the quality of evolution education, from the notorious "intelligent design" textbook *Of Pandas and People* onward, he is unquestionably a member of the anti-evolution movement.

Famously, Behe testified for the losing side in *Kitzmiller et al v Dover School Area School District et al*, where he humiliated himself by admitting that "intelligent design" is just as scientific as astrology. Less famously but more revealingly, he is serving as an expert witness for the plaintiffs in *ACSI et al v Stearns et al*, arguing that biology classes in fundamentalist Christian schools that use young-earth creationist biology textbooks are just as good as classes in public schools that use biology textbooks presenting mainstream biology.

Hacking's preferred label "anti-Darwin" is misleading in its own right. Evolutionary theory, as he acknowledges, is not confined to Darwin's work alone, and creationists — whether of the young-earth, old-earth, or intelligent design variety — are not attacking just Darwin but anything in the entire edifice of evolutionary science that happens to offend their various religious predilections. Hacking cites the title of Behe's first book, *Darwin's Black Box*, to make his point that Behe is best described as anti-Darwinian. He should have looked further, to its subtitle: *The Biochemical Case Against Evolution*.

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Unraveling Angiosperm Evolution

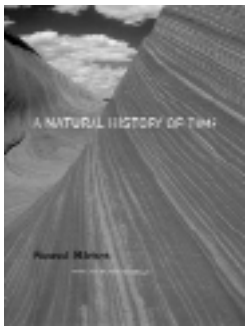
A recent article in the journal *Nature* reviews the progress in understanding the emergence of angiosperms … or what the rest of us call flowering plants. With the addition of molecular data — including studies of gene function, duplication, and loss — several new proposals have been advanced to identify the most likely features of the common ancestors of this important group. Despite the ongoing uncertainty about *which* evolutionary scenario is the best, the authors are clear about what options have been ruled out and what types of evidence that researchers should now seek to answer the remaining questions — an example of the way a real scientific controversy is addressed and resolved.

For the creationism/evolution debates, the angiosperms are important for two main reasons. First, they contradict the persistent argument from anti-evolutionists that "no new major groups" of organisms have emerged since the Precambrian. Second, the uncertainty about angiosperm phylogeny has been a mainstay of criticisms of evolution, including this web page at the Institute for Creation Research: <http://www.icr.org/goodsci/botintro.htm>.

Unfortunately, the title of the article will provide productive mining for anti-evolutionists for years to come.

Frohlich MW, Chase MW. 2007. After a dozen years of progress the origin of angiosperms is still a great mystery. *Nature* 450: 1184–9.

BOOK REVIEWS



A Natural History of Time

by Pascal Richet
translated by John Venerella
Chicago: University of Chicago Press, 2007. 471 pages

Reviewed by
G Brent Dalrymple

For centuries and lacking significant evidence to the contrary, much of the Western world thought that an omnipotent god specially created the earth and the first humans over a period of a few days. This conclusion was derived from interpretations of certain sacred texts, particularly the Bible, which was then thought to be the source of all truth about nature and the universe that surrounds us. Given these "facts", then, it was not entirely unreasonable to believe that humanity is at the center of the universe and arrived on the scene at the beginning of time, only a few thousand years ago. In the seventeenth and eighteenth centuries, however, a few inquisitive and enterprising souls began to realize that there was a great deal of information about the history of earth and its cosmic surroundings recorded in the stars and in the rocks, and what we know today as science was born. Gradually, over the next few centuries, careful observations and rational experiments replaced myth and theology as the best source of information about the physical history of the universe. Pascal Richet, a Senior Geophysicist at the Institut de Physique du Globe de Paris, and a distinguished scientist, guides us through the critical events of this transition.

This is not a book about the age of the earth and the cosmos. Rather, it is an accounting of the history and development of people's thinking about, and exploration of, deep time. Richet takes the reader on a grand adventure that begins at the time of ancient Egypt and ends in 1953, when Clair Patterson made the first reliable measurements of the age of meteorites and showed convincingly that the earth was probably of the same age of 4.5 billion years. Patterson's historic result, however, was not the end of the story but only a new beginning of a quest that has resulted in a rich and detailed knowledge of the history of the earth, the solar system, and the universe. The reader will have to go elsewhere for the discoveries of the past half-century, but fortunately that story is readily available in other recent texts.

In some passages of this fascinating history, Richet does not quite flesh out the story. For example, we learn all of the essentials (minus the mathematics) about Lord Kelvin's calculations based on heat flowing from the earth's crust and the effect that Kelvin's work had on the understanding of deep time for more than a half century. But Richet never really tells us enough about why Kelvin's calculations were wrong and why heat flow considerations could not (and still cannot) reveal the age of the earth, so the reader is left wondering where Lord Kelvin, arguably the most prominent physicist of his day, went wrong. In other passages, in contrast, Richet explores subjects in satisfyingly rich detail. For example, he leads the reader through the initial discovery and gradual understanding of heat and how widely ranging this new knowledge impacted not just geology but physics and other fields of science and engineering as well. One of the things I like a lot about this book is Richet's ability to show how and why seemingly unrelated discoveries in physics rapidly influenced important discoveries in geology and geophysics.

Here and there throughout the text are whimsical asides that are not only fun but also truly expand our insights about the science and the scientists of the day. My favorite can be found on pages 256–8, where Richet discusses the connection between the Big Bang theory and the Martians. He recounts the story of Percival Lowell (1855–1916), the mathematician turned businessman turned astronomer who built the Lowell Observatory on a mountain peak near Flagstaff, Arizona. Lowell was fascinated by the earlier reports of continents, seas, and canals on Mars, and spent much of his astronomical career studying that planet and writing about its presumed inhabitants. It was at the Lowell Observatory in 1912 that VM Slipher first observed the red shift in the light from distant galaxies and correctly interpreted it as evidence that the other galaxies were moving away from the Milky Way galaxy in all directions, that is, that the universe was expanding. The expansion, or more properly inflation, of the universe is one way in which the age of the universe is measured and is the original basis for the Big Bang theory. Richet concludes, with tongue in cheek, "The now classic Big Bang theory and the age of the universe thus owe something, at least indirectly, to the Martians."

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For a translation, this is a surprisingly smooth read, and the rare turgid passages do not really detract from the overall quality of the prose. Overall, I found this to be a satisfying and easy read as well as an approach to the telling of a fascinating story that I have not encountered in any other book. Richet has kindly left out the mathematics of the subject and the book is devoid of complicated graphs. The result is a book that even readers with only a modest understanding of science will find easy to read, yet which is rich enough in its narrative to satisfy even the most knowledgeable specialist.

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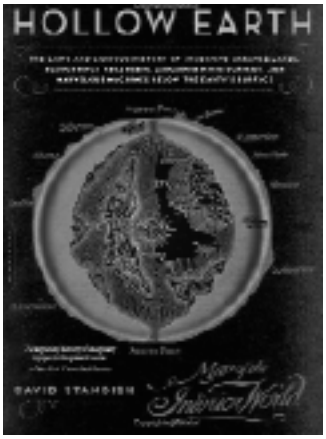
Hollow Earth:
The Long and Curious History of Imagining Strange Lands, Fantastical Creatures, Advanced Civilizations, and Marvelous Machines Below the Earth's Surface

by David Standish
Cambridge (MA): Da Capo Press, 2006. 304 pages

Reviewed by Ken Feder

Though I am certain that I saw every one of the 104 episodes of the *Superman* series that ran on television between 1951 and 1957 (and that were relentlessly rebroadcast on a local New York station throughout my childhood in the early 1960s), few of them have stayed with me as much as the two-parter about the Mole Men. Disturbed by the excavation of the world's deepest oil well, these oddly appealing creatures — looking a bit like nightmarish teletubbies — are drawn to the surface world. Naïve waifs, they are almost killed by terrified denizens of that surface only to be saved by Superman, whereupon they return to their home, deep in the core of an apparently hollow earth.



I remember being transfixed by the notion of a world beneath our own and, it turns out, I have not been the only one so intrigued. In *Hollow Earth: The Long and Curious History of Imagining Strange Lands, Fantastical Creatures, Advanced Civilizations, and Marvelous Machines Below the Earth's Surface*, David Standish has written a thoroughly enjoyable, entertaining, and hugely informative book on the history of speculation about a world within the world. As the book's dust jacket trumpets, "*Hollow Earth* is for anyone interested in the history of strange ideas that just won't go away." As such, it is a wonderful case study for those interested in other "strange ideas that just won't go away," like the biblical account of the origin of the universe, the earth, life on earth, and of the human species.

To be sure, much of the book is a compendium of crackpots — some rather charming, and some not quite so — but the list of those involved in spreading the hollow earth gospel includes some of the brightest scientific luminaries of the seventeenth and eighteenth centuries. As Standish points out, Edmond Halley was an early proponent, suggesting that no fewer than three hollow, concentric spheres float independently beneath the surface on which we live, going so far as to suggest that these three spheres might actually be self-contained worlds, each with its own source of heat and light and each, perhaps, filled with living creatures. The independently rotating spheres within were viewed as providing a scientific explanation for the earth's wandering magnetic poles, but there was something just as important for Halley and those who followed. In their view, God would not have wasted all that valuable interior real estate by making the earth solid; a hollow planet provided ever so much more room for God's living creations.

When it comes to hollow earth proselytizers, however, none match the outright loopiness of John Cleves Symmes as detailed in an entire chapter of *Hollow Earth*. Symmes appears to have been a man of no particular distinction when, in 1818, he began distributing a circular in and around St Louis, declaring his belief in a hollow earth and pledging his life to the pursuit of its exploration. The interior of the earth was accessible, Symmes believed, through enormous openings at both poles, openings that were to be called, much to his delight, "Symmes holes". Symmes doggedly pursued support and funding for an expedition to these vast entryways to the worlds beneath.

You have to credit his chutzpah at least. Symmes (using a pseudonym) was the likely author of a novel that Standish characterizes as a detailed accounting of what Symmes believed he would actually find at the center of the earth. Though the characters in the novel are fictional, the real Symmes is an offstage member of the cast and the novel is consistently self-referential and self-reverential. The new lands found in the hollow earth are called (don't laugh) Symzonia, and Symmes the author repeatedly has characters in the novel refer to Symmes (the guy in the real world) as a brilliant scientist and philosopher, one of the great thinkers of the modern world (remember this is Symmes writing about, well, Symmes). As Standish points out, along with being a polemic in support of exploration that would lead to the entrance to the hollow earth, the book, *Symzonia: A Voyage of Discovery* is the first example of American utopian fiction. Symzonia is a wonderful

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place, far superior to the surface world. Standish's hilarious discussion of Symmes is, by itself, worth the price of admission to *Hollow Earth*.

Standish devotes several chapters not so much to the actual belief in a hollow earth, but to the exploitation of that concept by fiction writers, including the usual gang of suspects: Edgar Allen Poe, Jules Verne, Arthur Conan Doyle, L Frank Baum, and Edgar Rice Burroughs. Almost certainly, none of these authors believed in the validity of Symmes Holes, rotating hollow spheres, or mole people, yet all used the mysterious, unexplored frontier inside the earth as a setting, the curious stage on which their fictional dramas unfolded. In locating their lost worlds in the interior of the earth, these and myriad other authors were part of a longstanding tradition of situating invented, mysterious realms in places unattainable as a result of location and distance. Writers and movie producers have long done exactly this, from Plato who placed Atlantis in the middle of the Atlantic Ocean and in a time far removed from his own to George Lucas who positions his *Star Wars* action "a long time ago, in a galaxy far, far away." For the above-mentioned late nineteenth- and early twentieth-century authors, the notion of a hollow earth was not a fixation but merely a convenient fiction, an expedient place to locate their utopias — and dystopias.

If I have one criticism of Standish's book, it would be that he devotes too much of the book (three and a half chapters out of eight) to this literary exploitation of the hollow earth concept. I would have preferred a far more extensive discussion of late twentieth- and early twenty-first–century claims concerning the reality of a hollow earth, an issue that Standish only touches upon in his final chapter.

But these are minor complaints. For the wealth of information provided and a wonderfully readable, smart-alecky writing style, David Standish's *Hollow Earth* belongs on the bookshelf of every scientist, historian, and fan of speculative fiction, especially those who are interested in "strange ideas that just won't go away."

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Darwin's Gift to Science and Religion

by Francisco Ayala
Washington (DC): Joseph Henry Press, 2007. 237 pages

Reviewed by
Michael R Dietrich

In this book targeted at a general audience, Francisco Ayala brings both his theological and biological expertise to bear on the challenge of contemporary "intelligent design" creationism. Trained in a Catholic seminary in Spain and now a distinguished evolutionary biologist, Ayala sees no conflict between religion and science. Indeed, he argues that evolutionary biology provides an important solution to the theological problem of evil.

The problem of evil is a classic theological conundrum that faces Christians who believe that God is simultaneously all powerful and all good. How could such a deity allow evil to exist in the world? Ayala's solution is "Darwin's gift" of evolutionary biology. Translated into evolutionary terms, the problem of evil becomes the problem of why numerous imperfections could be allowed in a wide range of organisms if in fact they were created by an all powerful and all good deity (p 159). Why would God design human eyes with a blind spot, Ayala asks, and squid eyes without? "Did the Designer have greater love for squids than for humans and, thus, exhibit greater care in designing their eyes than ours?" (p 154). Evolution by natural selection provides the answer for these imperfections. Evolution is a tinkerer, working with what is available to make what it can, imperfections and all. To ascribe the "dysfunctions, oddities, cruelties, and sadism that pervade the world of life" to the direct agency of the Creator, according to Ayala, "amounts to blasphemy" (p 160). Ayala's advice to religious persons is to accept that evolution by natural selection saves them from this blasphemy. At the same time, Ayala counsels that science has its limits and does not exclude religion or religious understanding. For Ayala, science provides sound understanding of the natural world, while religion speaks to questions of meaning and value that simply lie beyond the domain of any scientific investigation.

Ayala's explanation of evolutionary biology in *Darwin's Gift* is masterful. He effortlessly explains the conceptual foundations of evolution in sections on natural selection, adaptation, and speciation. With characteristic clarity, Ayala also includes recent results from genomics and molecular biology. The result is a rich portrait of evolutionary biology that is accessible to a wide range of readers. Chapters 3 to 7 in *Darwin's Gift* are dedicated to a careful explanation of the basic processes of evolution and natural selection, their application to human evolution, and the relevance of new understanding drawn from the study of molecular sequences of DNA and proteins. The incorporation of results from molecular biology is especially valuable to a general audience that rarely sees the intersection of genomics, bioinformatics, and evolutionary biology.

Ayala also includes a final chapter on the history and philosophy of science. While he acknowledges that it is not necessary for the arguments he makes earlier in his book, it is a welcome introduction to ideas of evidence, inference, and change in biology.

Darwin's Gift is an masterful addition to the popular literature on evolutionary biology. Ayala does not present an exhaustive survey of now familiar creationists' objections, nor should he. Instead, he offers in clear and lucid prose an

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interesting and incisive critique of design based on his rich understanding of both evolutionary biology and Christian theology. Although *Darwin's Gift* has few imperfections itself, its advice to embrace nature's imperfections and understand them through evolutionary biology is extremely compelling.

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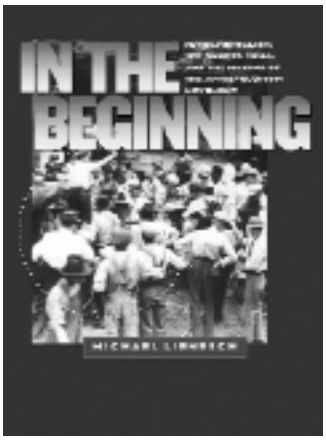
In the Beginning: Fundamentalism, The Scopes Trial, and the Making of the Antievolution Movement

by Michael Lienesch
Chapel Hill (NC): University of North Carolina Press, 2007.
338 pages

Reviewed by Kevin C Armitage

The May 20, 2007, issue of the *Cincinnati Enquirer* treated the opening of the so-called Creation Museum in Petersburg, Kentucky — just a short drive from Cincinnati — with coverage that can only be described as fawning. The front page featured a red banner that framed the museum opening as a courageous new entrant in the "Creation vs Evolution" debate, followed by a large, bold headline that posed the question, "Did Man Walk Among the Dinosaurs?" The coverage continued into the Forum section under the headline "What the Lord Has Made." The newspaper did not attempt to explain any of the basic scientific facts that contradict young-earth creationist claims.

The coverage by the *Enquirer*



points to the fact that anti-evolutionists are funding and building institutions, institutions that clearly exert, as in the case of the *Enquirer*, influence over other establishments of civil society. In other worlds, anti-evolutionism is not just a rejection of science or a political ideology, but a powerful social movement with its own identity, organizations and framing of political issues. It is precisely the understanding of anti-evolutionism as an abiding and powerful political movement that political scientist Michael Lienesch explores in his excellent *In the Beginning*.

Lienesch accomplishes this task by applying social movement theory to understand the history of anti-evolutionism. Happily, he does so in a sophisticated yet jargon-free manner that should satisfy academic and lay readers alike.

Anti-evolutionism as a movement derives from a series of pamphlets titled *The Fundamentals*, published and distributed for free by millionaire oilman Lyman Stewart. These pamphlets not only articulated a fundamentalist reading of biblical texts, but helped their audience forge a common character, an identity — not simply an ideology — "that formed the fundamentalist foundation on which creationism would be built" (p 9). That identity defined both Christian conservatives and their enemies, setting up the possibility that fundamentalists might be mobilized for political ends.

The mobilization was largely wrought by traveling lecturers — anti-evolutionists copied the Chautauqua circuit in this regard — who brought the fundamentalist message to both conservative and mainline denominations. Yet Christians were divided by both social and ideological factors and many remained wary of engaging the secular world. The movement needed an issue that would unite its followers and compel them to political action. In other words, the fundamentalist movement needed to frame an issue to perpetuate itself. Evolution, of course, was that issue. What social movement theorists term "framing" is the manner in which activists diagnose a malady, propose solutions, and motivate followers to ameliorative action. It was the theory of evolution — and the teaching of the theory in both university and secondary schools — that, according to fundamentalists, accounted for the growing secularity of society. Furthermore, they argued that teachers were responsible for indoctrinating naïve students into this theory, thereby displacing traditional values of home and community. Evolution, then, summarized and organized an inchoate hostility toward modern life into a specific, tangible enemy.

Yet to reach beyond their base and influence the public sphere, movements must engage in a process of "frame alignment" — the continual redefinition of issues so that they resonate with new audiences. One successful example of anti-evolutionist frame alignment was to place the creation story at the center of Christian belief. To cast doubt on a literal reading of creation meant "casting doubt on the fall from innocence, which meant denying the doctrine of the atonement, which meant eliminating any promise of salvation" (p 86). Thus not only did anti-evolutionists seize the center of Christian thought, but also cast doubt on theistic evolutionists. Controversy over teaching evolution in schools also provided a kind of built-in issue on which the anti-evolution movement could demand institutional change at the local, state and federal levels. And in "the Great Commoner" William Jennings Bryan, the movement found the perfect figure to help translate populist energy into tangible political gains. The state of Tennessee, for example, forbade

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the teaching of evolution in its public school classrooms.

It is a testimony to Lienesch's use of social movement theory that readers will actually see the Scopes Trial with fresh eyes. Each side believed it had won. Anti-evolutionists succeeded in "turning their cause into a conflict between irreconcilable enemies: Bryan and Darrow, creation and evolution, religion and science" (p 169). Their crusade would continue. Yet when anti-evolutionists poured their energies into the presidential campaign of Herbert Hoover — in no small part because his opponent, Al Smith, was Roman Catholic — they won a Pyrrhic victory: Hoover largely ignored them. Soon fundamentalists turned their energies to other causes, or withdrew from public life altogether. The Great Depression sapped what was left of its resources, causing many scholars to misinterpret the Scopes Trial as a crushing and irrevocable loss for anti-evolutionism.

In his final chapter — the majority of this book is about the years between World War I and the Great Depression — Lienesch shows how creationism has continually re-created itself up to the present day. Beginning in the 1930s anti-evolutionists retreated in order to regroup, but they never abandoned the institutions that sustain political movements: their publishing houses, radio communications, traveling lecturers, bible conferences and youth camps all flourished in the decades anti-evolutionism was supposedly moribund. Yet if this book has a missing link, it is that the middle of the twentieth century passes by much too quickly. I wished for greater insight into the ways anti-evolutionism maintained itself during the lean years. After all, it certainly was ready to seize the political moment when it came. As the new Christian Right became powerful in the late 1970s and 1980s, anti-evolutionists once again asserted their agenda with considerable success.

Lienesch concludes by noting the remarkable uniformity of anti-evolutionist arguments over time — and that despite setbacks to their movement, they are, as one Kansas pastor noted, "in it for the long haul" (p 239). The Creation Museum and the Discovery Institute have replaced the World's Christian Fundamentals Association, and agitators like the indefatigable William Bell Riley have given way to the likes of Phillip Johnson. This continuity is only one sign that the anti-evolution movement is not abating. It is Lienesch's considerable achievement to demonstrate exactly why that is so.

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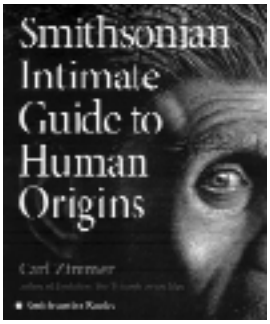
Smithsonian Intimate Guide To Human Origins

by Carl Zimmer
New York: Smithsonian Books, 2005. 176 pages

Reviewed by Pat Shipman

In this book, science writer Carl Zimmer sets out to give a brief overview of human evolution that is timely, accessible, and suitable for the intelligent general reader. This is a task many writers have attempted, but few have succeeded as well as Zimmer does. He strikes a superb balance between a highly readable style and a sophisticated scientific content, judging precisely when to stop and explain basic concepts essential to the larger points he is making.

Much of what will appeal to readers is the clear, jargon-free prose. Zimmer does an excellent job of writing directly and summarizing the high points of theories without "dumbing down" the content. He manages to review the history of Darwin's development of evolutionary theory in the absence of any genetic information and switches back and forth between



fossil discoveries and living primates with ease.

Zimmer also provides an excellent, brief explanation of DNA and its uses in establishing the relationships among living forms as well as what DNA can and cannot say about extinct species. These can be daunting subjects, but Zimmer shows how straightforward and understandable genetics can be when properly explained.

The author emphasizes the abundant evidence that modern humans and apes shared a common ancestor while pointing out the fallacy of thinking that modern humans are descended from living apes, when in fact, both have evolved for millions of years since their divergence from a common ancestor. Since creationists and "intelligent design" advocates are still confused by this subtlety, it is heart-warming to see a book that clearly explains the difference between having a common ancestor and being descended from one another.

Zimmer recounts some of the history of fossil hominin discoveries and the evolution of different species of hominins. In one section, he discusses the seemingly contradictory anatomical evidence that early hominins were both bipedal and tree-climbing. Without attempting to force a false resolution, Zimmer presents several different lines of research. He brings in information about when living primates that are predominantly quadrupedal resort to bipedality; he considers ecological reconstructions of the landscape in which bipedalism evolved; and he presents computerized studies of the advantages and disadvantages of being bipedal with different stances and types of anatomy.

The book touches on many important developments that occurred during human evolution:

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tool-making, the origin of language, the appearance of art and ornaments, the origin of modern humans and our spread around the globe. The reader is given just enough fascinating information to be hungry for more.

My favorite section is the discussion of a classic experiment with Kanzi, a bonobo who was encouraged to make stone tools. A banana was placed in a box that was tied shut with a rope. Kanzi was shown how to strike a sharp-edged flake from a pebble by archaeologist and expert knapper Nicholas Toth. Kanzi was also shown how to use the flake to cut the rope and get the banana. Kanzi watched Toth with intense interest, yet was unable to remove a single flake in the fashion Toth had shown him though he tried repeatedly. Eventually, Kanzi created his own successful tool-making technique. He hurled the stone against the floor until it smashed into sharp fragments, which he immediately snatched up to cut the rope and get the banana.

At the outset, this experiment was designed to test the hypothesis that modern apes do not make flaked stone tools because they have not been taught how to; the banana provided the motivation. Like all truly elegant experiments, the results not only answered the original question but also revealed the flaws in the experimental design. Kanzi the tool-maker showed that our interpretations of the past are hampered by the limits of our experience.

Was it a failure that Kanzi could not make flaked tools — or was it a creative success that Kanzi invented a new way to obtain sharp stone pieces to cut the rope? Clearly there is more than one way to get the banana. Chimps are not early hominins and early hominins are not simply hairy humans lacking modern technology.

A significant part of what will attract readers is the book itself. It is a good size (larger pages than a standard text but fewer than 200 of them) and it has many well-placed color illustrations. The book looks interesting and is. I found no dead spots where general readers would roll their eyes in boredom and put the whole thing down.

The biggest failing of the book, sadly, is also in the illustrations. For example, in a section on methods of dating rocks, there is a photograph of foraminifera (very tiny water-living creatures that make shells used to date rocks about 500 million years old) and a drawing or painting of a reconstruction of a conodont (one of the most primitive vertebrates, used to date geological strata of 500 to 250 million years ago). Neither conodonts nor foraminifera are very pertinent to dating the human evolutionary record, which goes back only about 7 million years.

Troublingly, some of the illustrations do not show what they purport to show. The "gorilla skull at Down House, Charles Darwin's residence" is a female baboon skull and the "drawing of Java Man, a *Homo erectus* fossil" is a photograph of a chimpanzee skull. Both of these erroneously labeled illustrations came from the same photo library, which ought to be a warning to future science writers. The intelligent reader is likely to wonder why these illustrations do not jibe with information in the text.

Sadly, the illustrations are in a sense wasted space. They look lively and interesting but they do not further the readers' understanding of the subject. For example, one image shows a chimp skull and a human skull, which could be used to demonstrate the anatomical differences that make apes apes and humans humans. The caption says, "A chimpanzee skull, left, compared to a human skull." This illustration is merely wallpaper, not a means of conveying information.

Nonetheless, I would recommend this book to general readers who want to gain a greater understanding of the broad outline of human evolution and how researchers are attempting to unravel it. Zimmer has done a fine job of hitting on the main points, explaining the underlying concepts, and inserting just enough detail about new techniques or controversies to engage the reader's attention.

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The Wonderful Adventures of Nat Selleck and Eva Lou Shinn in Sci Fi Land: A Spoof on Evolution and Natural Selection

by A Nonimous
Claremont (CA): Paige Press, 2007
85 pages

Reviewed by Nicolaas Rupke

Ever since Darwin's *Origin of Species*, the theory of evolution has been the subject of parodies. In particular the descent of humans from apes has been humorously treated in cartoons, verse, and literary sketches. An early classic of evolution parody was Charles Kingsley's description of the clash between Richard Owen and TH Huxley over the proximity between apes and humans, which clash centered on a brain structure called "hippocampus minor." In reaction to the Huxley–Owen "tournament" Kingsley wrote "a little squib for circulation among his friends," entitled "speech of Lord Dundreary ... on the great hippocampus question" in which the noble lord, who had been to Eton where he had been switched for getting his Latin wrong, "accurately" expresses the general sense of the issue by confusing a hippocampus with a hippopotamus. Some of the same material went into *The Water Babies* in which Kingsley created an amalgam of Owen and Huxley in the character of "Professor Ptthmllnsprts" (Put-them-all-in-spirits).

Almost a century later appeared what surely must be the all-time classic of evolution parody, *Bau und Leben der Rhinogradentia* (1957), published pseudonymously by Harald Stümpke. The booklet was translated into several languages, including English as *The Snouters* (1967; 1982). Its author, the Karlsruhe University zoologist

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Gerolf Steiner, invented the *Rhinogradentia* or "nose walkers," an order of mammals, discovered on a group of islands in the South Pacific, the Hi-Iay Islands. The animals are characterized by highly specialized nasal organs, used mainly for locomotion, but also for food gathering and other purposes. The spoof made light of certain iconic elements in the narrative tradition of Darwinism.

Half a century on, *The Wonderful Adventures of Nat Selleck and Eva Lu Shinn* more comprehensively takes aim at evolution theory in the form of a capricious history of evolutionary theory from Darwin till today. Concepts such as evolution and natural selection appear as real people (or gods and goddesses), disguised in word play alterations. For those who do not recognize which concept or historical person is hidden behind the name, a cast of characters at the end explains all. Few readers will have difficulty identifying Nat Selleck, Eva Lou Shinn, and Randy Verry A Shinn, nor will they be mystified by Charles Durwen, Chuck Loyall, Terrible Tom Huxtable, and Ernie Heckler. Less obvious is Lorenzo the Magnificent (Konrad Lorenz), included in the story for his promulgation of Aryan race ideology.

As the story develops, the spoof increasingly changes into an instrument of criticism of Darwin-related theories, especially when the narrative arrives at contemporary figures such as Will Edson (Edward Wilson) and Dick Dockins (Richard Dawkins) who turned to the goddess Cultura for help in the distressing situation of Homer Sapp (*Homo sapiens*) merely being a temporary vehicle for Selfish Gene's journey into the future. From Cultura's

> ample skirts issued forth a miasma of memes ready to infect Homer Sapp's brain … Truth to say, Homer Sapp was in parlous condition, enslaved in body and mind by imperious genes and memes. But his case was not hopeless, said Dockins. Enlightened and encouraged by Scienza, he could throw off the shackles locked on by Selfish Gene, disinfect his brain of religious fantasies and metaphysical moonbeams, and learn to behave like an English gentleman, cooperating generously and unselfishly for the common good. (p 59–60)

What is the purpose of this spoof, apart from humorous entertainment? Parodies, we know, have often functioned as means of subtle criticism. Kingsley, in his rendition of the Owen–Huxley fight over the relation of humans to apes, indicated that more than scientific disagreement was involved and that personal rivalry added much fuel to the fire. Both sides in the controversy were doused with a bucket full of irony. A similar intent seems present in *The Wonderful Adventures of Nat Selleck and Eva Lu Shinn*. Water gets poured over the combatants, the winners and the losers, the great and the small, the atheistic and the religious, the liberal and the conservative — although Dick Dockins and allied evolutionary psychologists get an extra dousing. The story ends with the Darwin year 2009, when a voice from heaven inquires "Where were you when I laid the foundations of the earth …" (Job 38:4). Keep an open mind — the author seems to indicate — for there are more things in heaven and earth than are dreamt of in the certainties of entrenched positions.

Yet in order more precisely to understand this booklet's portent, it will be helpful to know who its author, A Nonimous, is. The reader may want to learn that he belongs to the generation of historians of science who professionalized the subject after World War II and is the author of many books, including a seminal study in the history of evolutionary biology, *The Death of Adam* (1959): John C Greene. Greene's importance for the subject as well as his particular approach and stance were celebrated with a festschrift in his honor, *History, Humanity and Evolution* (1989), edited by James Moore, who pointed out that a perennial concern in Greene's work has been the problem of constructing an evolutionary world view that does not cede the realm of human values to scientific expertise. This explains why the sarcasm of the parody is particularly biting when it treats of evolutionary psychology and Dockins's memes. The booklet is a cherry on the cake of Greene's impressive oeuvre and a welcome addition to the literary genre of scientific spoofs.

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[*The Wonderful Adventures of Nat Selleck and Eva Lou Shinn in Sci Fi Land* is available from its publisher, Paige Press, a division of The Regina Group, PO Box 280, Claremont CA 91711, online at <www.reginabooks.com>.]

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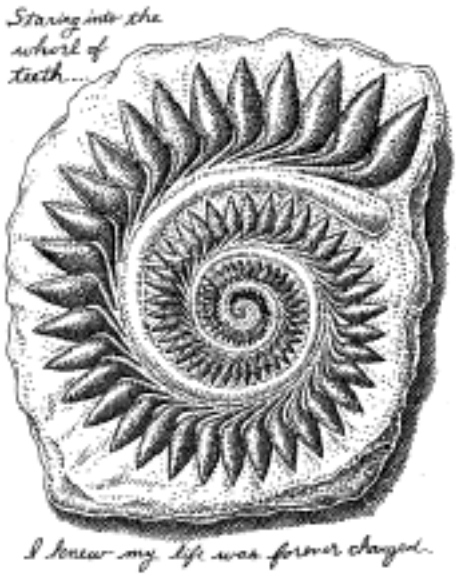

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