REPORTS OF THE NATIONAL CENTER FOR SCIENCE EDUCATION

DEFENDING THE TEACHING OF EVOLUTION IN THE PUBLIC SCHOOLS

Volume 28, Number 4 **JUL-AUG, 2008**

CONTINUES *NCSE REPORTS & CREATION/EVOLUTION*

Surviving the Flood on the Web

State Standards in Florida

Louisiana's Law Opens New Doorway to Creationism

History of Creationism in South Africa

Ask About Evolution

News from Arizona, California, Iowa, Ohio, South Dakota, and Texas

CONTENTS

NEWS

4 Louisiana Enacts a New Creationist Law
Joshua Rosenau
A perspective on the history of and major players behind the so-called Louisiana Academic Freedom Act.

10 MnCSE Honors Ken Hubert
Randy Moore
A state organization supporting science education honors a teacher who stepped up to oppose creationism in the public school classroom.

10 Polling Creationism in Canada
As in the US, about half of respondents seem committed to an evolutionary explanation of life on earth, but there are significant differences compared to polls taken south of the border.

11 Updates
News from Arizona, California, Iowa, Ohio, South Dakota, and Texas.

NCSE NEWS

14 News from the Membership
What our members are doing to support evolution and oppose pseudoscience wherever the need arises.

MEMBERS' PAGES

19 Ask About Evolution Before Election Day
Stan Braude
From local school boards to federal nominees, positions on science, and particularly evolution, should be a part of the public record. Too often, concerned citizens simply neglect to ask the candidates.

20 Books: The Evolutionary Reference Desk
Where to go for comprehensive resources on evolution and anti-evolutionism.

22 NCSE *On the Road*
Check the calendar here for NCSE speakers.

ARTICLES

17 From the World-Wide Flood to the World Wide Web: Creationism in the Digital Age
Stephen C Burnett
When people want to learn about evolution, the first stop is often a search engine that identifies websites with appropriate information. While the situation has improved somewhat, these searches often return creationist sites when a user searched for information about evolution.

FEATURES

28 Evolution in the Sunshine State: The Fight over Evolution in the State Science Education Standards
Brandon Haught
Before final approval, the Florida State Board of Education inserted the phrase "scientific theory of" before the word "evolution" in its science education standards. Evolution is now a part of the Sunshine Standards, but it was not without a struggle.

32 Calvin Meets the Hominins: A Brief History of Creationism in South Africa
LW Retief
Although it shares conservative theological roots with its North American counterpart, creationism in South Africa is also flavored by colonial history and political movements.

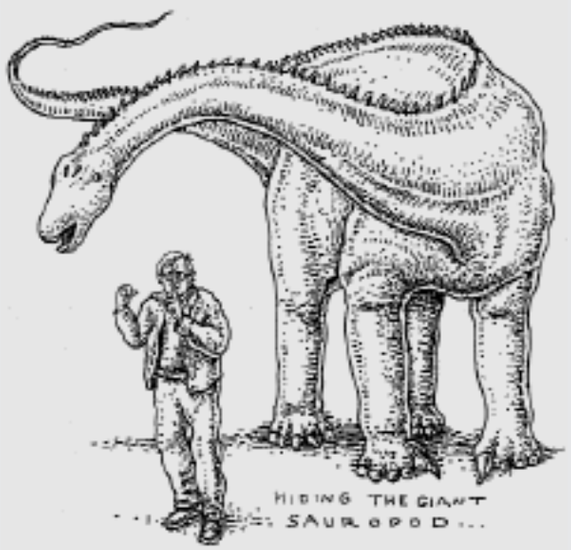
BOOK REVIEWS

35 *Darwin Strikes Back: Defending the Science of Intelligent Design*
by Thomas Woodward
Reviewed by Jason Rosenhouse

36 *Secularism & Science in the 21st Century*
edited by Ariel Keysar and Barry A Kosmin
Reviewed by Lawrence S Lerner

37 *Beyond the Firmament: Understanding Science and the Theology of Creation*
by Gordon J Glover
Reviewed by Stephen Matheson

38 *Intelligent Design Versus Evolution*
edited by Louise Gerdes
Reviewed by Michael K O'Sullivan



REPORTS OF THE
NATIONAL CENTER FOR SCIENCE EDUCATION
DEFENDING THE TEACHING OF EVOLUTION IN THE PUBLIC SCHOOLS
CONTINUES *NCSE REPORTS* & *CREATION/EVOLUTION*

VOLUME 28, NR 4, JUL-AUG 2008
ISSN 1064-2358

Address editorial correspondence to the editor. Style guidelines can be found at <http://www.ncseweb.org/author_instructions.asp>. Write to the publisher regarding address changes, missing issues, purchases of back issues, reprint rights, and related issues.

Cover: Students in the University of Wisconsin Summer Research Apprentice Program use on-line resources for background information for research projects. Photo by Andrew J Petto.

Other artwork ©Ray Troll, 1997
For more information on Ray's work explore his website at <www.trollart.com>.

FROM THE EDITOR

We live in the "Information Age" — or, perhaps, the *Mis*information Age. As I tell my scientific writing and research classes: "If we operated the Interstate Highway System in the same way as we do the Internet, I could put a sign in my driveway that reads 'Welcome to Interstate 94.'" Stephen C Burnett's lead article shows us that it is possible to use an Internet search engine such as Google™ and retrieve literally millions of "hits" on search terms related to evolution. However, savvy web designers know how to increase the number of hits on a single site — by using multiple pages or repeated references in the same site — and we have reported before that many of the websites returned in a naïve search for information about evolution are actually those written by *anti*-evolutionists. Burnett reports that the situation has improved — somewhat — over the past decade, but professional research and education organizations are still behind in creating and maintaining informational websites that support evolution. What Trinity told Neo in *The Matrix* may be true, but even if "the answer is out there" in the matrix of interacting computers, so is a lot of false information.

Things seem to have calmed down a bit for the time being in Louisiana and Florida. In the interlude, we have two pieces that provide a bit of perspective on the events in those two states. Brandon Haught describes some of the coalitions — people, organizations, and politicians — involved in the recent revision of science education standards in Florida. His feature gives us a perspective that only someone who was in the middle of the action can provide. NCSE's Josh Rosenau brings us the conclusion of the Louisiana debacle after the signing of the so-called Louisiana Science Education Act by Governor Bobby Jindal. It seems that Louisiana is poised to surpass Arkansas as the state with the most anti-evolution laws overturned by federal courts.

Leon Retief also provides a knowledgeable perspective on creationism in South Africa. Although there are powerful religious motivations there — as there are elsewhere — the clash of colonial powers in South Africa also played an important role in the development of creationism there.

IN THE NEWS

Over 65 million years after her death, Chicago's Field Museum of Natural History celebrity *Tyrannosaurus rex* (nicknamed Sue) is stirring up controversy. Anti-evolutionists in a South Dakota town ironically named Faith were denied the opportunity to present their "alternative" view of the traveling exhibit featuring the famous dinosaur (p 13).

On the education front, read updates about the cases of Chris Comer — the Texas Education Agency science supervisor who was dismissed for not being sufficiently "neutral" about creation/evolution issues — and John Freshwater — the Ohio science teacher dismissed for replacing the approved science curriculum with biblical and creationist materials (p 13).

There was progress in supporting evolution education in higher education institutions. A federal judge in California found baseless all charges of civil rights violations against the University of California system because it deemed certain texts and courses in Christian high schools to be unacceptable preparation in the sciences. But the verdict is being appealed (p 11).

There is much to read, and our reviewers have busy. Book reviews begin on page 35.

RNCSE 28 (4) was printed in October 2008.

NEWS

Louisiana Enacts a New Creationist Law

Joshua Rosenau

Anti-evolution legislation flourished this year, inspired by a creationist movie featuring Ben Stein. While the bills failed in most states, the effort in Louisiana succeeded based on years of effort by local creationists. They had been laying the groundwork for a major legislative assault since *Edwards v Aguillard* overturned the state's Balanced Treatment Act in 1987. They regrouped, organized, and enacted a bill that invites, but does not force, teachers and school districts to breach the constitutional separation of church and state.

Senate Bill 561, styled the "Louisiana Academic Freedom Act," was prefiled in the Louisiana Senate by state senator Ben Nevers (D–Bogalusa) on March 21, 2008, and assigned to the Senate Education Committee, of which Nevers is the chair. In name, the bill was similar to the so-called academic freedom bills then pending in Florida and other states. Those bills in turn are 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 in conjunction with the producers of Ben Stein's *Expelled* (to be discussed extensively in a future issue of *RNCSE*). But in its content, Louisiana's SB 561 was also modeled on a controversial policy adopted by a local school board two years ago.

Backed by the Louisiana Family Forum (LFF) — a religious right group with a long history of promoting creationism and attacking evolution education in the state — the Ouachita Parish School Board's policy was laced with creationist language. The policy, passed in 2006, declares that students should 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 (see *RNCSE* 2006 Nov/Dec 26 [6]: 8–11).

LFF has a long history of promoting creationism and attacking evolution education in the state; its website "promotes 'Teaching the Controversy' when it comes to matters such as biologicial [*sic*] evolution". It 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 (<http://www.lafamilyforum.org/site100-01/1001014/docs/4-1originssciencewebsites.pdf>). Of particular concern, LFF distributes "textbook addenda" which they hope teachers and students will use to correct purported errors in standard scientific textbooks. The "addenda" cite the flood geology of young earth creationist Jonathan Woodmorappe and even the writings of geocentrist Malcolm Bowden.The LFF was also the object of an aborted earmark by Senator David Vitter (R-Louisiana) for studying various suggesting "improvements" in science education in Louisiana (see *RNCSE* 2007 Sep–Dec; 27 [5–6]: 9–12).

The origin of the Louisiana bill

The central language in the Ouachita Parish School Board's policy surfaced in SB 561. The bill extended 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." The bill added directives aimed at state and local education administrators, instructing them "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 "assist teachers to find more effective ways to present the science curriculum where it addresses scientific controversies." (See a detailed account of the bill's origin and political history in *RNCSE* 2008 Mar/Apr; 28 [2]: 8–11.) Despite attempts to conceal its intentions by inserting a disclaimer borrowed from model legislation distributed by the Discovery Institute — the bill "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" — it is difficult to reconcile these assurances with LFF's stated mission: "to persuasively present biblical principles in the centers of influence on issues affecting the family through research, communication and networking." The Reverend Barry Lynn, executive director of Americans United for Separation of Church and State, cited LFF's involvement when confidently telling the Baton Rouge *Advocate* (2008 Apr 1), "This is all about God in biology class," a contention bolstered by bill sponsor Nevers's admission to the paper that he introduced the bill at the behest of the LFF. While denying that the bill would pave the way for creationism to be taught in the state's pub-

Joshua Rosenau is NCSE's Public Information Project Director.

lic schools, 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," even though the bill singles out evolution, the origin of life, global warming, and human cloning for special attention.

Despite advice from a broad spectrum of opponents, the Senate Education Committee stripped out only a little of the bill's objectionable language in a hearing on April 17, 2008. Senator Nevers, according to the *Advocate* (2008 Apr 18), "denied that his proposal was a bid to promote creationism," saying, "This bill does not promote religion or ask to introduce religion in any classroom" — a protestation he, LFF, and the Discovery Institute repeated often and unconvincingly throughout the legislative process.

In order to mollify its opponents, the bill was amended to remove instructions that "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" along with the list of scientific topics to be critiqued. The bill was also renamed the Louisiana Science Education Act and renumbered SB 733. The bill now required the state's Board of Elementary and Secondary Education (BESE) merely to "allow and assist" teachers and administrators to "create and foster an environment within public elementary and secondary schools that promotes critical thinking skills, logical analysis, and open and objective discussion of scientific theories being studied." BESE was charged with providing "support and guidance for teachers regarding effective ways to help students understand, analyze, critique, and objectively review [the] scientific theories being studied." The bill's emphasis now lay in a provision encouraging teachers to use "supplemental textbooks and other instructional materials to help students understand, analyze, critique, and review scientific theories in an objective manner, as permitted by

TEXT OF SB 733 AS SIGNED BY GOVERNOR JINDAL

SENATE BILL NO. 733

BY SENATORS NEVERS, ADLEY, AMEDEE, BROOME, CASSIDY, CHEEK, CRAVINS, CROWE, DONAHUE, DORSEY, DUPLESSIS, ERDEY, B. GAUTREAUX, N. GAUTREAUX, GRAY, HEBERT, KOSTELKA, LONG, MARTINY, MOUNT, MURRAY, RISER, SHAW, SHEPHERD, THOMPSON AND WALSWORTH AND REPRESENTATIVES ANDERS, ARMES, ARNOLD, AUBERT, AUSTIN BADON, BARROW, BURFORD, HENRY BURNS, TIM BURNS, BURRELL, CARMODY, CARTER, CHANDLER, CHANEY, CORTEZ, DANAHAY, DIXON, DOERGE, DOWNS, EDWARDS, ELLINGTON, FANNIN, FRANKLIN, GEYMANN, GISCLAIR, GREENE, ELBERT GUILLORY, MICKEY GUILLORY, GUINN, HARDY, HARRISON, HAZEL, HENDERSON, HENRY, HILL, HINES, HOFFMANN, HOWARD, HUTTER, KATZ, KLECKLEY, LABRUZZO, LAMBERT, LIGI, LITTLE, LOPINTO, MCVEA, MILLS, MONICA, NORTON, PEARSON, PERRY, PUGH, RICHARD, RICHARDSON, RITCHIE, SCHRODER, SIMON, SMILEY, GARY SMITH, JANE SMITH, TUCKER, WHITE AND WILLIAMS

AN ACT

To enact R.S. 17:285.1, relative to curriculum and instruction; to provide relative to the teaching of scientific subjects in public elementary and secondary schools; to promote students' critical thinking skills and open discussion of scientific theories; to provide relative to support and guidance for teachers; to provide relative to textbooks and instructional materials; to provide for rules and regulations; to provide for effectiveness; and to provide for related matters.

Be it enacted by the Legislature of Louisiana:

Section 1. R.S. 17:285.1 is hereby enacted to read as follows:

§285.1. Science education; development of critical thinking skills

A. This Section shall be known and may be cited as the "Louisiana Science Education Act."

B. (1) The State Board of Elementary and Secondary Education, upon request of a city, parish, or other local public school board, shall allow and assist teachers, principals, and other school administrators to create and foster an environment within public elementary and secondary schools that promotes critical thinking skills, logical analysis, and open and objective discussion of scientific theories being studied including, but not limited to, evolution, the origins of life, global warming, and human cloning.

(2) Such assistance shall include support and guidance for teachers regarding effective ways to help students understand, analyze, critique, and objectively review scientific theories being studied, including those enumerated in Paragraph (1) of this Subsection.

C. A teacher shall teach the material presented in the standard textbook supplied by the school system and thereafter may use supplemental textbooks and other instructional materials to help students understand, analyze, critique, and review scientific theories in an objective manner, as permitted by the city, parish, or other local public school board unless otherwise prohibited by the State Board of Elementary and Secondary Education.

D. This Section 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 nonreligion.

E. The State Board of Elementary and Secondary Education and each city, parish, or other local public school board shall adopt and promulgate the rules and regulations necessary to implement the provisions of this Section prior to the beginning of the 2008–2009 school year.

the city, parish, or other local public school board."

Speaking to the *Advocate* (2008 Apr 20), the LFF's executive director expressed disappointment at the revisions to the bill, describing his support of it as now only lukewarm, even though Nevers assured the paper that the amendments "did not change the intent of the bill." Barbara Forrest, the co-author of *Creationism's Trojan Horse: The Wedge of Intelligent Design*, a member of NCSE's board of directors, and a philosophy professor at Southeastern Louisiana University, remained concerned. "The bill itself is still a very problematic bill, a stealth creationism bill," she explained. "The strategy now is to sanitize the terminology, which is what they did with the original bill and which they are doing now."

The *Advocate* (2008 Apr 19) editorially acknowledged that "it seems clear that the supporters of this legislation are seeking a way to get creationism … into science classrooms," but, "[a]t 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."

The bill passes

Shortly after the Senate bill cleared its committee in amended form, a bill containing the original Senate text was introduced in the House. House Bill 1168 was introduced in the Louisiana House of Representatives on April 21, 2008, and dubbed by its sponsor the "Louisiana Academic Freedom Act." That sponsor, Frank A Hoffman (R-District 15), had been the assistant superintendent of the Ouachita Parish School System when it passed the district's controversial policy.

While HB 1168 awaited its committee hearing, SB 733 was unanimously passed by the Louisiana Senate on April 28, 2008. The full Senate restored the list of supposedly controversial topics before sending the bill to the House. The move appeased the LFF, and sponsor Nevers told the Associated Press (2008 Apr 29) that he restored the list because without it the bill was too vague. Speaking earlier to the *Hammond Daily Star* (2008 Apr 6), Nevers was anything but vague about the bill, in effect acknowledging that its intent is to ensure that "scientific data related to creationism should be discussed when dealing with Darwin's theory."

After the bill passed the Senate, Alan Leshner, CEO of the American Association for the Advancement of Science, wrote to the New Orleans *Times-Picayune* (2008 May 6), observing, "proponents offer deceptive arguments about encouraging students to think critically. But Louisiana's education standards already do that. The real intent is to introduce classroom materials that raise misleading objections to the well-documented science of evolution and offer a religious idea called intelligent design as a supposed alternative."

On May 21, 2008, the House Education Committee took up the issue. It set aside the House's version of the bill, and passed SB 733 unanimously, in slightly amended form. The Associated Press reported (2008 May 21) that, over the course of a hearing that lasted close to three hours, "[s]cience teachers called Senate Bill 733 a veiled attempt to add religion to science classes." Critics pointed out that the bill's stated goals are already covered by policies set by the state's Board of Elementary and Secondary Education. Tammy Wood, a science teacher from the Zachary, Louisiana, school district, told the committee: "There is absolutely no need for this bill," and added, according to the *Advocate* (2008 May 21), "I am begging you here today to kill this bill."

Opponents cited the presence and testimony of out-of-state "intelligent design" advocates Caroline Crocker, CEO of the Intelligent Design and Evolution Awareness (IDEA) Center and Discovery Institute staffer Casey Luskin as evidence that the bill would open classrooms to creationism. Committee chairman Don Trahan (R–Lafayette) responded by proposing an amendment allowing BESE to forbid certain supplementary materials. Barbara Forrest told the committee that even the amended version was too broadly written. "Anything could get into the classroom," the Associated Press reported her telling the committee.

The bill, with Trahan's amendment in place, proceeded to the House floor. Then, as the *Advocate* (2008 Jun 12) explained, "[i]gnoring threats of a lawsuit, the Louisiana House" passed the bill, which "failed to generate a single question, passed 94–3 and appears poised for final approval."

"If this new law is used to promote religion in Louisiana public schools, I can guarantee there will be legal action," said Barry Lynn in a press release from Americans United (2008 Jun 12). Reminding legislators that the US Supreme Court overturned a Louisiana law requiring that evolution be balanced by creationism, Lynn added: "Louisiana students deserve better, and Louisiana taxpayers should not have their money squandered on this losing effort."

In an interview with the *Christian Post* (2008 Jun 12), John West, a vice president at the Discovery Institute, responded, "The proposed Louisiana law expressly states … 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 nonreligion.'" In an interview with the *Washington Times* (2008 Jun 12), Jason Stern, LFF's vice president, insisted "It's not about a certain viewpoint. It's allowing [teachers] to teach the controversy."

Louisiana Coalition for Science, a grassroots group recently founded to advocate for accurate science education, decried the vote in a press release (2008 Jun 11). Barbara Forrest, who helped establish the group, compared the legislative fight to the tactics used to pass the Balanced Treatment Act: "The Discovery Institute, a national creationist organization, and the Louisiana Family Forum are using the same old tricks, but with new labels. … Despite their denials, even the bill's backers know that SB 733 is a creationist bill written in creationist code language." She thanked Patricia Haynes Smith, Jean-Paul Morrell, and Karen Carter Peterson, the three repre-

sentatives who opposed the bill, and closed on an optimistic note: "Now that the House has passed the bill, the Senate has one more chance to do the right thing. The entire country is watching. They should reject this bill and let teachers do their jobs."

Given the bill's unanimous Senate passage, the only sticking point would have been the amendment allowing BESE to veto certain books. The Associated Press reported (2008 Jun 12), "Nevers said he will ask the Senate to approve the amendment. He stressed that the amendment does not require BESE to review all the materials. The state board would only step in if someone raised a question about whether the material was appropriate." In the remaining two weeks of the session, legislators were also struggling with controversial issues, including the next year's budget, a voucher proposal for New Orleans public schools, and an unpopular legislative pay raise.

On the governor's desk

Even before the bill passed the Senate, there had been questions about how Governor Jindal would respond. *The Washington Times* reported (2008 Jun 12), "A spokeswoman for Republican Gov Bobby Jindal would not say whether he will sign the bill, saying only that he will review it when it gets to his desk." Given that Jindal supported teaching "intelligent design" as an alternative to evolution during his campaign, a veto was seen as a long shot.

His remarks in an appearance on CBS's *Face the Nation* on June 15, 2008, did not clarify matters. Host Chris Reid asked Jindal about his views on "intelligent design". In response, Jindal opposed using state power to impose creationism, but also endorsed the basic creationist framing of the issue: "I do not think this is something the federal or state government should be imposing its views on local school districts. … I think local school boards should be in a position of deciding … what students should be learning. … Some want only to teach 'intelligent design', some only want to teach evolution. I think both views are wrong, as a parent." The Center for American Progress reacted to Jindal's statements by noting (2008 Jun 16) that Jindal's position "effectively giv[es] school boards *carte blanche* to teach scientifically inaccurate ideas, just like Kansas did in 2005, when it rewrote standards to cast doubt on evolution."

On June 16, 2008, the Louisiana Senate approved the bill as amended by the House of Representatives; this sent the bill to the governor, and bill opponents to the barricades. Will Sentell of *The Advocate* reported (2008 Jun 17) that those "[o]pponents [were] mostly outside the State Capitol," since "the Senate voted 36–0 without debate to go along with the same version of the proposal that the House passed … 94–3."

Opponents spoke forcefully against the bill; Jindal had twenty days to veto the bill or it would automatically become law, just as if he had signed it. Barry Lynn of Americans United told Sentell that the bill "is clearly designed to

AAAS's Alan I Leshner's letter to Governor Jindal

June 20, 2008

Dear Governor Jindal:

Recently you told CBS's Face the Nation that "the way we're going to have smart, intelligent kids is exposing them to the very best science." At the American Association for the Advancement of Science (AAAS), the world's largest general scientific society, we wholeheartedly agree. That is why we urge you to veto Senate Bill 733, the Louisiana Science Education Act, which appears designed to insert religious or unscientific views into science classrooms. The bill disingenuously implies that particular theories, including evolution, are controversial among scientists.

You called the scientific process exciting because scientists can "find facts and data and test what's come before you and challenge those theories." This is certainly true for the science of evolution. It involves multitudes of facts and data. Its principles have been tested and retested for decades. And yes, it has been subjected to scientific scrutiny—which has served to reinforce how fundamental evolution is. The science of evolution underpins all of modern biology and is supported by tens of thousands of scientific studies in fields that include cosmology geology, paleontology, genetics and other biological specialties. It informs scientific research in a broad range of fields such as agriculture and medicine, work that has an important impact on our everyday lives.

In short, there is virtually no controversy about evolution among researchers, many of whom, like you, are deeply religious.

What about intelligent design, which you addressed in your recent interview? Because it is not science, but a concept based on a religious belief, intelligent design might be an appropriate topic for a course on philosophy or world religions. But it has no place in a science classroom. From a scientific perspective, there is simply no way to test for the presence or absence of God or another "designer." From a legal perspective, intelligent design comes from a single religious viewpoint, and a federal judge appropriately ruled that teaching it in science class is unconstitutional.

In 1987, the US Supreme Court declared unconstitutional a Louisiana "creation science" law. Rather than step backward, look to the future by seeking to provide Louisiana students with a firm understanding of evolution and other essential scientific concepts so they can compete for high-skill jobs in an increasingly high-tech world economy. Asserting that there are controversies about these concepts among scientists — when in fact there are not — will only confuse students, not enlighten them. I urge you to protect the future of science education in your state by rejecting this bill.

[*Alan I Leshner is the chief executive officer of the American Association for the Advancement of Science.*]

smuggle religion into the science classroom, and that's unwise and unconstitutional." In an open letter to Governor Jindal posted on its website (see sidebar, below), LCFS urged Jindal to veto the bill, calling it "a thinly disguised attempt to advance the 'Wedge Strategy' of the Discovery Institute (DI), a creationist think tank that is collaborating with the LA Family Forum to get 'intelligent design' (ID) creationism into LA public school science classes" (<http://lasciencecoalition.org/2008/06/17/jindal-veto-sb-733/>).

One of Jindal's college professors lent his voice to a press release announcing the LCFS's open letter. Arthur Landy taught Jindal genetics at Brown University. He reminded Jindal, "Without evolution, modern biology, including medicine and biotechnology, would not make sense. In order for today's students in Louisiana to succeed in college and beyond, in order for them to take the fullest advantages of all that the 21st century will offer, they need a solid grounding in genetics and evolution. Governor Jindal was a good student in my class when he was thinking about becoming a doctor, and I hope he does not do anything that would hold back the next generation of Louisiana's doctors." Barbara Forrest added, " The governor has a moral responsibility to Louisiana children to veto this bill."

Others calling for Jindal to veto cited his training in biology. *The New York Times*, in a June 21, 2008, editorial, added that the bill "would have the pernicious effect of implying that evolution is only weakly supported and that there are valid competing scientific theories when there are not. In school districts foolish enough to head down this path, the students will likely emerge with a shakier understanding of science," and concluded, "If Mr Jindal has the interests of students at heart, the sensible thing is to veto this Trojan horse legislation."

The AAAS repeated its opposition to the bill in a letter dated June 20, 2008 (see sidebar, p 7). "The bill disingenously implies that particular theories, including evolution, are controversial among scientists," wrote AAAS's chief executive officer, Alan I Leshner. "Asserting that there are controversies about these concepts among scientists — when in fact there are

LOUISIANA CITIZENS FOR SCIENCE OPEN LETTER TO GOVERNOR JINDAL

June 16, 2008

Dear Governor Jindal:

SB 733, recently passed by both houses of the legislature, purports to enable teachers to help students "develop critical thinking skills, and respond appropriately and respectfully to differences of opinion about controversial issues."This is a seemingly noble-sounding but deceptive goal.

SB 733 is a thinly disguised attempt to advance the "Wedge Strategy" of the Discovery Institute (DI), a creationist think tank that is collaborating with the LA Family Forum to get intelligent design (ID) creationism into LA public school science classes. John West, associate director of DI's Center for Science and Culture, has even presumed to interpret SB 733 on DI's website so as to favor his group's agenda. … According to one Louisiana news account, West indicated that DI hopes to see its own creationist textbook, the deceptively titled *Explore Evolution*, used in our science classes as one of the supplements that SB 733 will permit teachers to use (*Opelousas Daily World*, 6/16/08). DI apparently has a financial as well as a religious and political interest in this legislation.

Creationism, which includes both young-earth creationism and ID, is not science but a sectarian view based on the Bible. Young-earth creationism is based on Genesis, and ID is based on the Gospel of John, as was established in federal court in the case of *Kitzmiller et al v Dover Area School District* (2005). The Bible was never intended to be a science textbook. Evolution has long been accepted by the Catholic Church and most other mainstream churches. The late Pope John Paul II said in 1996 that "new knowledge has led to the recognition of the theory of evolution as more than a hypothesis" (*Truth Cannot Contradict Truth*, October 22, 1996). As the pope recognized and other mainstream religions also recognize, there is no conflict between teaching children the scientific fact of evolution in school and providing religious instruction at home and in church. Millions of Americans lead committed religious lives while fully accepting modern science.

Since you hold a biology degree from Brown University, one of the nation's most prestigious schools, you certainly appreciate Theodosius Dobzhansky's famous insight, "Nothing in biology makes sense except in the light of evolution." You also surely understand that there is no scientific controversy over the fact of evolution. The current controversy is a political one, manufactured nationally by the Discovery Institute and here in Louisiana by the LA Family Forum, which does not represent the majority of Louisiana's citizens but would impose its agenda on our entire state, even our children.

The Establishment Clause of the First Amendment of the US Constitution is violated when the government endorses a sectarian doctrine, as SB 733 would do, despite denials by the bill's supporters. The section of SB 733 stipulating that the bill "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

not — will only confuse students, not enlighten them," he added. "I urge you to protect the future of science education in your state by rejecting this bill." A coalition of nine scientific societies led by the American Institute for Biological Sciences pointed out the added danger that "[i]f SB 733 is signed into law, Louisiana will undoubtedly be thrust into the national spotlight as a state that pursues politics over science and education."

Political conservatives joined the call. John Derbyshire wrote an essay at *National Review Online*, calling on Jindal to "Veto This Bill!" Like many observers, Derbyshire worried that "The entire effect of this law … will be that one cartload of Louisiana taxpayers' money will go to the Discovery Institute for their mendacious 'textbooks', then another cartload will go into the pockets of lawyers to defend the inevitable challenge to the law in federal courts, which will inevitably be successful, as they always are, and should be." This echoed earlier complaints by the *Advocate*'s editorial board, which wrote (2008 May 21) that the bill will "provide a full-time living for dozens of lawyers in the American Civil Liberties Union. They will have a field day suing taxpayer-funded schools as groups use Nevers' language to push Bible-based texts in the schools. That's unconstitutional, and we can see the taxpayer paying — and paying, and paying — for this policy in the future."

The bill becomes law

That concern was widely echoed when it was revealed that Jindal had signed the bill on June 25. Jindal's approval of the bill was buried in a press release announcing 75 bills he signed in previous days. Bill Barrow of the *Times-Picayune* broke the story on June 27, 2008, observing that the bill "attracted national attention and strongly worded advice" for Jindal. Jindal did not return media calls for comment.

"The possibility of the introduction of 'wacko' theories of the origins of life worries Carencro High School science teacher Warren Sensat," reported the Lafayette *Daily Advertiser* (2008 Jun 26). Sensat told the newspaper, "When you open the door to bring in unapproved curriculum, you can bring in some wacko stuff." Other teachers were less worried. Tim

against religion or nonreligion" actually comes from the DI's own model academic freedom act. If SB 733 were truly about teaching science, no such disclaimer would be needed.

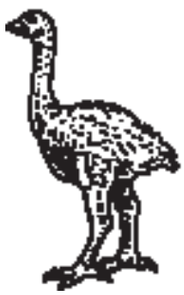
If SB 733 becomes law, we can anticipate the embarrassment it will bring to the state, not to mention the prospect of spending millions of taxpayer dollars defending the inevitable federal court challenge. Consider also that federal courts have uniformly invalidated every effort to attack the teaching of evolution in public schools, including, among others, (1) *Edwards v Aguillard*, a 1987 case that Louisiana lost in the U.S. Supreme Court; and (2) *Kitzmiller et al v Dover Area School District,* a 2005 Pennsylvania federal court case in which a conservative Republican judge appointed by President George W Bush thoroughly examined and rejected a school board policy that presented ID to students as an alternative to evolution.

With our state still recovering from Hurricanes Katrina and Rita, does Louisiana need the expense and embarrassment of defending — and losing — another lawsuit in federal court? What image will this legislation convey to high-tech companies and skilled individuals who might consider locating here? On your "Workforce Development" website, where you tell readers that "I am asking you to once again believe in Louisiana," you acknowledge that because of a "skills gap," the "training and education of our citizens does not meet the requirements of available jobs." You state that "the lack of economic mobility discourages many Louisianans, including thousands of young people who have left our state in search of greater opportunities." You also highlight Louisiana's low educational ranking as one cause of the "workforce crisis in LA": "In a 2007 national Chance-for-Success Index, Louisiana ranks #49 in the nation based on 13 indicators that highlight whether young children get off to a good start, succeed in elementary and secondary school, and hit crucial educational and economic benchmarks as adults." SB 733 will degrade the quality of science education just when the state is so working hard to improve public schools.

Surely you agree that SB 733 sends the wrong message to the nation if we want to develop additional high tech companies such as the Pennington Biomedical Research Center, LIGO, and other research universities and centers across the state. SB 733 will sacrifice the education of our children to further the political and religious aims of the LA Family Forum and the Discovery Institute, an out-of-state creationist think tank whose only interest in Louisiana is promoting *their* agenda at the expense of *our* children.

You have repeatedly stressed your commitment to making Louisiana a place where our young people can build families and careers. You can help to make Louisiana that place by proving that you support the hundreds of science teachers and thousands of students in the public schools and universities across the state. You can demonstrate your commitment to improving both Louisiana's image and our educational system by vetoing SB 733. The state and the nation are watching.

We call upon you to veto SB 733 in the best interests of our children and to protect the reputation of our state.



Tate, a science curriculum supervisor for the Lafayette Parish schools told the *Advertiser* that "he's not worried about teachers using inappropriate materials. He expects teachers to only focus on the state curriculum, but acknowledges that different ideas will always be brought into the classroom." Speaking to WWL-TV (2008 Jun 24), Louisiana ACLU Executive Director Marjorie Esman was less sanguine. "I think there's a lot of room for things to get sneaked into the classrooms that should not be there," she said.

Science education advocates are ready for action. "We're known for suing school boards when we need to do so and we will not shy away from doing that if that's what we need to do this case," the ACLU's Esman told WWL-TV (2008 Jun 24). Barry Lynn of Americans United took a firm stance in a press release (2008 Jun 27): "Let me state clearly and up front that any attempts to use this law to sneak religion into public schools through the back door will not be tolerated. … I call on all concerned residents of Louisiana to help us make sure that public schools educate, not indoctrinate."

Discovery Institute vice president John West insisted that the bill would not be used for such purposes. West told the *Times-Picayune*, "Someone who uses materials to inject religion into the classroom is not only violating the Constitution, they are violating the bill." But when the LFF's Gene Mills was asked by *New Scientist*'s Amanda Gefter (2008 Jul 9) "whether the new law fits with the organisation's religious agenda," he answered: "Certainly it's an extension of it." Gefter predicted that the new law's proponents are preparing to take advantage of its advocacy of supplementary textbooks: "The LFF is now promoting the use of online 'add-ons' that put a creationist spin on the contents of various science texts in use across the state, and the Discovery Institute has recently produced *Explore Evolution*, a glossy text that offers the standard ID critiques of evolution."

The LCFS website thanked its fellow defenders of the integrity of science education "in keeping with our southern tradition of good manners," but promised, "We intend to hold [supporters of the bill] to [their] public assertions that no creationist materials will be used in our children's science classes and that no religious concepts will be presented to our children as science" (<http://lasciencecoalition.org/2008/06/27/thank-you-from-lcfs/>). LCFS also urged parents and students to keep an eye out on the materials being introduced in classrooms, asking them to contact LCFS and NCSE if their schools are introducing creationism. Like LCFS, NCSE is watching Louisiana, and we both intend to hold the bill's proponents to their public assertions that no creationist materials will be used in science classes and that no religious concepts will be presented to children as science.

Author's address
Joshua Rosenau
NCSE
PO Box 9477
Berkeley CA 94709-0477
rosenau@ncseweb.org

MnCSE Honors Ken Hubert

Randy Moore

On June 20, 2008, the Minnesota Citizens for Science Education (MnCSE) sponsored Evolution 101, a day-long workshop to help K–12 teachers teach evolution more effectively. The workshop was attended by approximately 150 attendees and was held at the University of Minnesota's Bell Museum of Natural History as part of Evolution 2008. At the workshop, MnCSE honored Ken Hubert of Faribault, Minnesota, whose insistence that biology teachers in his school teach evolution ultimately led to *LeVake v Independent School District #656.* Deciding this lawsuit, the court affirmed that teachers cannot teach their own curriculum — in this instance, that Hubert's colleague and fellow biology-teacher Rodney LeVake must teach evolution and could not teach creationism in his biology course. (See *RNCSE* 1999 Nov/Dec; 19 [6]: 8–9; 2000 Jan–Apr; 20 [1–2]: 13–14; and 2000 Sep/Oct; 20 [5]: 8–9 for background.) The recognition of Hubert also included a letter of commendation from NCSE. For more information about MnCSE, see <http://www.mnscience.org>.

Ken Hubert (left) with MnCSE president James Curtsinger

Author's address
Randy Moore
Department of Biology
University of Minnesota, MCB 3-104
420 Washington Avenue SE
Minneapolis MN 55455
RMoore@umn.edu

Randy Moore is the HT Morse–Alumni Distinguished Teaching Professor of Biology at the University of Minnesota. A former editor of The American Biology Teacher, *he received NCSE's Friend of Darwin award in 2004. His latest book, coauthored with Mark D Decker, is* More than Darwin: An Encyclopedia of the People and Places of the Evolution–Creationism Controversy *(Westport [CT]: Greenwood Press, 2008).*

Polling Creationism in Canada

Among Canadians, 58% accept evolution, while 22% think that God created humans in their present form within the last 10 000 years, and 20% are unsure, according to a new poll from Angus Reid Strategies (available on-line at <http://www.angus-reid.com/polls/view/31446/canadians_choose_evolution_over_creationism>. The poll was conducted among a nationwide random sample of 1007 Canadian adults interviewed on-line on July 29 and 30, 2008, and its margin of error is +/- 3.1%.The results are virtually unchanged from a 2007 poll, in which 59% of the respondents accepted evolution, 22% accepted creationism, and 19% were unsure.

A press release (available online at <http://www.angus-reid.com/uppdf/2008.08.05_Origin.pdf>) noted a number of additional findings: "Men [were] more inclined than women to believe in evolution (69% versus 48%); women [were] more prone to believe in creationism (28% versus 16%) ... Males (69%), younger adults (67%) and those with at least one university degree (71%) [were] more inclined to believe in evolution ... [and] Albertans (40%) and Conservative Party supporters (29%) [were] more likely to think humans were created by God."

Comparing these results with poll results in the United States is not straightforward, since the question that the Gallup Organization has used since 1982 offers two versions of a pro-evolution response: "Human beings have developed over millions of years from less advanced forms of life, but God guided this process" and "Human beings have developed over millions of years from less advanced forms of life, but God had no part in this process."The corresponding Angus Reid response — "Human beings evolved from less advanced life forms over millions of years" — omits any mention of God.

According to a useful summary (available on-line at <http://www.gallup.com/poll/21814/Evolution-Creationism-Intelligent-Design.aspx>), in the latest Gallup poll using the question, conducted in May 2008, 50% of respondents preferred the pro-evolution responses, with 44% preferring "God created human beings pretty much in their present form at one time within the last 10 000 years or so," and with only 5% volunteering a different response or declining to answer. It might seem, then, that Canadians are not as much supportive of evolution as they are dismissive of creationism, compared to their American counterparts.

As the political scientist and polling expert George Bishop observed ("Polls apart on human origins," *RNCSE* 2007 Sep–Dec; 27 [5–6]: 35–41), however, minor changes in the wording of poll questions about creationism and evolution can make a substantial difference in poll results, so it would be premature to jump to any conclusions. Over the years, *RNCSE* has carried a variety of reports and analyses of such polls, including Otis Dudley Duncan and Claudia Geist's "The creationists: How many, who, and where?" (2004 Sep/Oct; 24 [5]: 26–33).

UPDATES

Arizona: House Bill 2713, dubbed the Students' Religious Liberties Act, died when the Arizona legislature adjourned on June 27, 2008. If enacted, the bill would have required 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." Neither evolution nor science in general was specifically mentioned in the bill, and its lead sponsor, Representative Doug Clark (R–District 6), told 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" (see *RNCSE* 2008 Mar/Apr; 28 [2]: 16–8). That was not enough to allay all fears, however: in his op-ed for the *Daily Star* (2008 Jun 25), Gilbert Shapiro wrote, "The Center for Inquiry Community of Southern Arizona opposes this bill because it is a transparent attempt by conservative Christian groups to get their theology into our public schools. It is a classic 'wedge strategy/Trojan Horse' type of initiative, consistent with the approaches used to teach creationism." HB 2713 was passed by the House of Representatives on March 24, 2008; a somewhat amended version was passed by the Senate on June 26, 2008; but the House failed to take action on the Senate version before the legislative session ended.

California: The defendants in *Association of Christian Schools International et al v Roman Stearns et al* have prevailed. The case, originally filed in federal court in Los Angeles on August 25, 2005, centered on the University of California system's policies and statements relevant to evaluating the qualifications of applicants for admission. The plaintiffs — the Association of Christian Schools International, the Calvary Chapel Christian School in Murrieta, California, and a handful of students at the school — charged that the university system violated the constitutional rights of applicants from Christian schools whose high school coursework is deemed inadequate preparation for college; they objected to the university system's policy of rejecting high school biology courses that use textbooks published by Bob Jones University Press and A Beka Books as "inconsistent with the viewpoints and knowledge generally accepted in the scientific community." (For background, see *RNCSE* 2005 May–Aug; 25 [3–4]: 12–3.)

On March 28, 2008, Judge S James Otero ruled in favor of the defendants' motion for partial summary judgment, which established only the constitutionality of the university system's policies and statements relevant to evaluating the qualifications of applicants for admission (see *RNCSE* 2008 Mar/Apr; 28 [2]: 16–8). Still unaddressed, however, was the "as applied" issue — that is, the question of whether those policies and statements were properly and fairly applied to the specific decisions cited in the lawsuit.The defendants subsequently filed a motion for summary judgment on the plaintiffs' "as applied" claims. That motion was granted in Judge

Otero's August 8, 2008, ruling (available on-line at <http://www.universityofcalifornia.edu/news/acsi-stearns/ruling0808.pdf>), which concluded, "Because Plaintiffs fail to raise any genuine issue of material fact to support their as-applied claims, Defendants' Motion is GRANTED" (emphasis in original).

In addition to a host of procedural considerations, the latest ruling addressed the university system's decision to deny approval for a biology course submitted by Calvary Baptist School (not to be confused with the Calvary Chapel Christian School), which used the A Beka text *Biology: God's Living Creation*. The book was evaluated by Barbara Sawrey, who described it as taking an "overall un-scientific approach to the subject matter"; her opinion was echoed by the defendants' expert witnesses Donald Kennedy and Francisco J Ayala (a Supporter of NCSE), who stated that neither the A Beka text nor Bob Jones University Press's *Biology for Christian Schools* is appropriate for use as the principal text in a college preparatory biology course. Kennedy wrote, "the problem is not ... that the creationist view is taught as an alternative to scientific explanations, but that the nature of science, the theory of evolution, and critical thinking are not taught adequately."

Michael Behe, a proponent of "intelligent design" creationism, served as an expert witness for the plaintiffs, but his defense of the textbooks was unavailing. In his ruling, Judge Otero wrote, "Plaintiffs offer little admissible evidence to the contrary. Plaintiffs' Biology expert, Dr Michael Behe, submitted a declaration concluding that the BJU text mentions standard scientific content. ... However, Professor Behe 'did not consider how much detail or depth' the texts gave to this standard content. ...Therefore, Professor Behe fails to refute one of Professor Kennedy's primary concerns that the nature of science, the theory of evolution, and critical thinking are not taught adequately. Accordingly, there is no genuine issue of material fact as to this issue. Defendants had a rational basis for rejecting Calvary Baptist's proposed Biology course."

The University of California's provost Wyatt R Hume expressed satisfaction with the ruling in a press release (available on-line at <http://www.universityofcalifornia.edu/news/acsi-stearns/courtdecisionsummary_080808.pdf>), saying, "The University welcomes students of all religious faiths and recognizes that a diversity of educational backgrounds among our students, including religious education, enriches the UC community and the academic experience. As we have said all along, the question the University addresses in reviewing courses is not whether they have religious content, but whether they provide adequate instruction in the subject matter." Charles Robinson, the university system's general counsel, added, "Judge Otero's decision confirms that UC may apply the same admissions standards to all students and to all high schools without regard to their religious affiliations." The case is not over yet, however: the plaintiffs have appealed the ruling to the Ninth Circuit Court of Appeals.

California, Weed: "Butteville Union Elementary School District trustees, as well as school administrators, are considering adding 'intelligent design' to the school's seventh-grade science curriculum," according to the *Mount Shasta News* (2008 Aug 20). The trustees are reportedly seeking legal advice. "I think this will be a big issue in the Supreme Court before long," board president Stephen Darger, a practicing attorney and former police officer, told the newspaper. "Maybe it will be with this school." Trustee Steve Hart, who proposed the idea, added, "What we would like to do is include [in the curriculum] a way for students to look at evolution with critical minds and become aware of things (in evolution) that are no longer accepted … Science has always excluded supernatural phenomenon [*sic*]. Although there are risks, this is something that would benefit the entire school." Dave Clarke, a biology instructor at the College of the Siskiyous, retorted, "Intelligent design is used to defend fallacies … Supporters say there is a lack of evidence for evolution, but a lack of evidence for one thing is not evidence for another." He also described "intelligent design" as a veiled form of creationism. NCSE is monitoring the situation.

Weed was the site of a previous controversy over evolution education. In March 1990, a new teacher discovered that a local minister was scheduled to show a creationist film and conduct a discussion about creationism and evolution in seventh- and eighth-grade public school science classes in Weed, as he reportedly had done for the past fifteen years. Despite the protests of the teacher and two members of NCSE, Ken Goehring and Michael Roesch, the minister conducted his presentation. Goehring and Roesch then appealed to the trustees of the school board, provoking a massive public controversy. (The Institute for Creation Research fanned the flames by holding a two-day "Back to Genesis" rally in May 1990, attracting hundreds of people.) The school board sought the advice of the state department of education, which reviewed a tape of the minister's presentation and described it as "extremely uninformed and sloppy" and "irresponsible." Eventually, the school board voted to refer the decision over whether to teach creationism to administrators and teachers — a result that Goehring described as a victory but not a complete victory, predicting that creationists would pressure teachers. For details, see *NCSE Reports* 1990 Jul/Aug; 10 [4]: 1, 9–10; 1991 Jan/Feb; 11 [1]: 6–8.

Iowa, Creston: Steve Bitterman, the community college instructor who claimed that he was fired for telling his students that the biblical story of Adam and Eve ought not to be taken literally, agreed not to file a lawsuit against Southwestern Community College in Creston, Iowa, according to the *Des Moines Register* (2008 Jul 19; see *RNCSE* 2007 Sep–Dec; 27 [5–6]: 20–4 for background). As part of the settlement, he will receive $20 000. His lawyer was quoted as saying, "What was for him a purely objective, academic exercise in studying the religious beliefs of different Western civilizations became a group of fundamentalist students taking exception when it came time for their God to be put under the micro-

scope." A lawyer for the college said that by settling, the college avoided a costly lawsuit but admitted no liability.

Ohio, Mount Vernon: The Mount Vernon City School District Board of Education unanimously voted at its June 20, 2008, meeting to begin proceedings to terminate the employment of John Freshwater, a middle school science teacher in the district. "Freshwater preached his Christian beliefs about how the world began, discredited evolution and didn't teach the required science curriculum, the board says. He was told to stop teaching creationism and intelligent design, but he continued to do so, an investigation found," the *Columbus Dispatch* (2008 Jun 21) reported. According to the *Dispatch*, "After learning of the board's decision, Freshwater called the consultants' report half-truths and said he never veered from the state standards for teaching science"; his lawyer added that Freshwater intends to appeal the board's decision and described the complaints as "fabrications."

Complaints about Freshwater's behavior have reportedly been lodged over the course of the last eleven years. A complaint filed in federal court on June 13, 2008, accused Freshwater of inappropriately bringing his religion to school — including by displaying posters with the Ten Commandments and Bible verses, branding crosses into the arms of his students with a high-voltage electrical device, and teaching creationism (see *RNCSE* 2008 Mar/Apr; 28 [2]: 16–8 and 2008 May/Jun 28 [3]: 5–10 for details). The investigative report commissioned by the district stated, "Freshwater engaged in teaching of a religious nature, teaching creationism and related theories and calling evolution into question. He had other materials in his classroom that could be used for that purpose," including Jonathan Sarfati's *Refuting Evolution* and Jonathan Wells's *Icons of Evolution*. The report also quoted complaints from high school teachers in the district about the effect of his teaching.

Subsequently, the *Dispatch* reported (2008 Jul 7), "The Mount Vernon eighth-grade science teacher who has been under scrutiny for focusing on creationism and intelligent design in his classes will contest his planned firing at an Aug. 26 hearing. The date was announced tonight during a school board meeting in which several supporters for John Freshwater publicly chastised the school board for its plans to fire him." Freshwater told the Associated Press (2008 Jul 9) that he was disappointed with the way in which the investigation that resulted in the school board deciding to fire him was conducted, saying, "They used half-truths. They didn't interview people who had been in my classroom ... Science teachers at the high school: Why would you interview them?"

South Dakota, Faith: A traveling exhibit featuring a cast replica of "Sue" — a *Tyrannosaurus rex* unearthed near Faith (about 100 miles northeast of Rapid City) and now resident at the Field Museum in Chicago — is operating without the assistance of local young-earth creationists, who sought to present their views in conjunction with the display. According to the *Rapid City Journal* (2008 Aug 8), "The Field Museum wasn't interested in making the creation science perspective part of its Sue exhibition, according to Whitney Owens, traveling exhibitions director for the Chicago museum. When museum officials learned that creation science adherents in Faith, including Wayne Sletten, a retired veterinarian and longtime Faith resident, planned a series of lectures titled 'Sue & Creationism Explained' in the same community center, they objected." The objection was successful, thanks to a clause in the museum's contract with the Faith Chamber of Commerce that required any local additions to the content of the display to be approved by the museum. Faith's creationists, who hold that Sue died about 4300 years ago, a casualty of the Flood, expressed resignation at the outcome — "we're used to viewpoint discrimination, that entrenched point of view in traditional science that isn't willing to allow evidence of a young earth" — and held a series of talks in "a private building directly across the street from the Sue exhibit." The museum's Whitney Owens, for his part, explained, "Sue's a scientific exhibition, so we felt that non-scientific elements would be best displayed elsewhere. We wanted to keep the attention on the science of Sue and on her return to Faith, not on the supernatural." Although the exhibit has been on the road since 2000, Owens said that Faith was the first place where creationism was a problem.

Texas: Chris Comer, the former director of science at the Texas Education Agency who was forced to resign over a dispute involving "intelligent design" creationism (see *RNCSE* 2008 Jan/Feb; 28 [1]: 4–7) filed suit against the TEA in federal court in early July 2008. The *Dallas Morning News* (2008 Jul 3) reported that Comer alleges "she was terminated for contravening an 'unconstitutional' policy at the agency. The policy required employees to be neutral on the subject of creationism — the biblical interpretation of the origin of humans, she said. The policy was in force, according to the suit, even though the US Supreme Court has ruled that teaching creationism as science in public schools is illegal."

The Associated Press (2008 Jul 3) added that Comer's suit "alleg[es] she was illegally fired for forwarding an e-mail about a speaker who was critical of teaching a controversial alternative to evolution. ... The e-mail, which was intercepted by a state education leader, was about a speaker coming to Austin who had critical views of creationism and the teaching of intelligent design. The federal courts have ruled that teaching creationism as science in public schools is illegal under the US Constitution's provision preventing government establishment or endorsement of religious beliefs. 'The agency's "neutrality" policy has the purpose or effect of endorsing religion, and thus violates the Establishment Clause,' the lawsuit said."

In her complaint (available online at <http://www.ncseweb.org/pdf/ComerComplaint.pdf>), Comer asked for a declaratory judgment that the TEA policy of being "neutral" on the subject of

creationism violates the Establishment Clause; a declaratory judgment that her firing was unconstitutional; an offer from the TEA of reinstatement of Comer to her previous position as director of science; an injunction against the TEA "having, expressing, or imposing through any means, a policy of 'neutrality' with respect to the teaching of creationism in the Texas public schools, or a policy that expressly or implicitly equates evolution and creationism, or that in any way credits creationism as a valid scientific theory"; and legal fees.

Comer's suit also revived broader concerns about the management of the TEA. The *Austin American-Statesman* (2008 Jul 4) reminded its readers, "In an interview with the Statesman last year, Comer said the actions of science curriculum employees at the agency had been subject to increasing scrutiny in 2007 as the State Board of Education prepared to consider revisions to the science curriculum for all Texas public school students. The board was originally slated to consider the science curriculum earlier this year but has postponed that discussion until November. The board plans to hold a first vote on the curriculum in January and a final vote in March." (A draft of the revised standards was issued on September 22, 2008.)

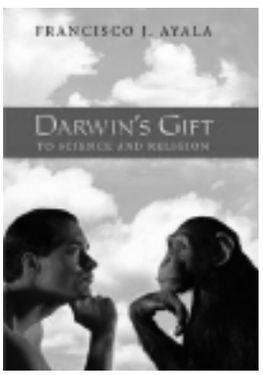
NCSE NEWS

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 **Francisco Ayala**'s latest book, *Darwin's Gift to Science and Religion* (Washington [DC]: Joseph Henry Press, 2007; reviewed in *RNCSE* 2008 Mar/Apr; 28 [2]: 33–4), was accorded a special section in the May 2008 issue of *Theology and Science* (6 [2]). **Michael Zimmerman**, Susan Blackmore, Joshua M Moritz, Michael J Behe, Walter R Hearn, William A Dembski, NCSE Supporter **Michael Ruse**, and John F Haught all offered their various reactions to the book, and Ayala responded. Ayala is University Professor, Donald Bren Professor of Biological Sciences, and Professor of Philosophy at the University of California, Irvine; he received the National Medal of Science, the highest scientific honor in the United States, in 2001. Also of interest in the same issue of *Theology and Science* is Jack Maze and Cyril V Finnegan's "Does Darwin's theory deserve theological support, and does evolution need Darwin's theory?" (239–54), arguing that, due to what they deem to be the explanatory limits of natural selection, "the version of evolution that should be taught is not Darwinian or neo-Darwinian evolution. Instead, evolution should be taught as being inevitable following laws of thermodynamics ... [or] as comparative biology, the comparison of biological entities at all levels that leads to certain inferences, the most exciting of which is that evolution certainly has occurred."



James Bandoli published an article in the April 2008 issue of *The American Biology Teacher* entitled "Do state science standards matter? Comparing student perceptions of the coverage of evolution in Indiana & Ohio public high schools" (70: 212–6). The article describes the result of a survey on the coverage of evolution in public high schools in Indiana (whose standards received an A in **Lawrence S Lerner**'s 2000 survey of the treatment of evolution in state science standards) and Ohio (whose standards received an F). In 2003–2004, college freshmen who had taken only one biology course in high school in Indiana or Ohio were asked about (1) the time devoted to evolution, (2) their high school teacher's preferred explanation for biodiversity, and (3) their own preference among diversity explanations. The results showed that evolution gets significantly less coverage than cell biology or genetics. The states were similar in the time devoted to evolution, suggesting that the difference in state standards has little effect on high school biology curricula. Finally, there was evidence that teachers' views influenced students' views — students whose teachers emphasized evolution as the best explanation for diversity were more than twice as likely to prefer evolution as a diversity explanation as those whose teachers emphasized other explanations or did not discuss causes of diversity. Bandoli is Professor of Biology at the University of Southern Indiana.

NCSE deputy director **Glenn Branch**'s article "Creationism, intelligent design, and evolution" appeared in a new reference work, *Battleground Schools: An Encyclopedia of Conflict and Controversy* (Westport [CT]: Greenwood Press, 2007, vol 1, p 147–56), edited by Sandra Mathison and E Wayne Ross. "Evolution is clearly the most controversial topic in the public

school science curriculum in the United States," he began. "Among scientists, there is no significant controversy about the basic scientific issues: the earth is ancient (about 4.5 billion years old); living things have descended, with modification, from common ancestors; and natural selection, by adapting living things to their environments, is a major driving force in the history of life. As the National Academy of Sciences (1999) observes, 'The scientific consensus around evolution is overwhelming.' Recognizing the centrality of evolution to biology, the National Association of Biology Teachers and the National Science Teachers Association have taken a firm stand on the pedagogical necessity of teaching evolution. Teaching evolution is a matter of social controversy, however, owing to the prevalence of creationism — the rejection of a scientific explanation of the history of life in favor of a supernatural account — among the public. Not all anti-evolutionists are creationists, and not all creationists are fundamentalist Christians — there are creationists who identify themselves with Jewish, Islamic, Hindu, New Age, and Native American religious traditions — but the juggernaut of anti-evolutionist activity in the United States is propelled by Christian fundamentalism."

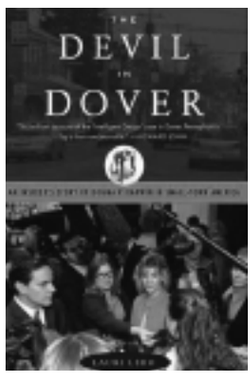
A more frivolous contribution by **Glenn Branch** appeared in Jake Kalish's *Santa vs Satan: The Official Compendium of Imaginary Fights* (New York: Three Rivers Press, 2008), which offered predictions about the outcome of hypothetical physical confrontations between unlikely foes. Asked to comment on the Adam versus Charles Darwin bout, Branch wrote, "[I]t's only fair to compare them when they were in their prime: in Darwin's case, when he was between college and the voyage of the *Beagle*; in Adam's case, when he was still in the Garden of Eden, before his rib was removed. It seems clear that Darwin would have won their fight then. He was fond of shooting, whereas Adam, as the first man, was obviously inexperienced and unsophisticated with any sort of weaponry, or even with fisticuffs. And as the proverb goes, you should never, ever, bring a naïf to a gunfight."

Lorence G Collins wrote a response (available on-line at <http://www.csun.edu/~vcgeo005/Snelling.htm>) to young-earth creationist Andrew Snelling's "Catastrophic granite formation: Rapid melting of source rocks, and rapid magma intrusion and cooling" (available on-line at <http://www.answersingenesis.org/contents/379/Catastrophic-Granite-Formation.pdf>), arguing, "Snelling has not considered all the available data that need to be taken into account to make his model valid and that he has not properly considered the full complexity of issues that have a bearing on his proposed young-earth model." Collins is a retired professor of geology at California State University, Northridge.

Edd Doerr reviewed the creationist film *Expelled* for *Free Inquiry* (2008 Aug/Sep; 28 [5]: 61), writing, "It is a crude, hack-propaganda flick boiling over with hostility toward science and scientists and is designed not only to attack evolution but also to blame Charles Darwin for Nazism, Stalinism, and the Holocaust. ... Stein tries to show that intelligent-design creationism has a modicum of scientific respectability, but he falls laughably short for anyone familiar with the controversy." Doerr is president of Americans for Religious Liberty (<http://www.arlinc.org>) and a former president of the American Humanist Association.

NCSE is pleased to congratulate the recipients of the Darwin–Wallace medals for 2008, who include one member and two Supporters of NCSE. In a press release dated May 27, 2008, the Council of the Linnean Society of London announced the award of thirteen medals for "major advances in evolutionary biology" since 1958 to Nick Barton, MW Chase, BC Clarke, **Joseph Felsenstein** (a member of NCSE), the late **Stephen Jay Gould** (a Supporter of NCSE), PR Grant, Rosemary Grant, JLB Mallet, **Lynn Margulis** (a Supporter of NCSE), the late John Maynard Smith, Mohamed Noor, H Allen Orr, and Linda Partridge. The awardees will receive their medals, which bear a profile of Darwin on the obverse and a full-face image of Wallace on the reverse, on the bicentennial of Darwin's birth, February 12, 2009. The society first awarded the medals in 1908, to seven recipients (including Alfred Russel Wallace himself), and again in 1958, to twenty recipients (including **Ernst Mayr**, later a member of NCSE). "In recognition of the continuing importance of research on evolutionary biology," according to the press release, "the Society is pleased to announce that it will now award the medal annually from May 2009." The Linnean Society of London is the world's oldest active biological society. It was there, on July 1, 1858, that papers entitled "On the Tendency of Species to form Varieties; and on the Perpetuation of Varieties and Species by Natural Means of Selection" were presented on behalf of Darwin and Wallace, thus announcing the theory of evolution by natural selection to the general scientific community.

Paul R Gross reviewed **Lauri Lebo**'s *The Devil in Dover: An Insider's Story of Dogma v Darwin in Small-town America* (New York: The New Press, 2008) for e-Skeptic (available on-line at <http://www.skeptic.com/eskeptic/08-07-16.html>). He writes, "Lebo, an experienced journalist and sometime specialist on education for the *York* (PA) *Daily Record*, attended, investigated, and reported on *Kitzmiller* from start to finish. Her book provides a rich account of the trial, its antecedents, and the post-verdict consequences for the Dover Area community. ... It is to date the most intimate, accessible, and affecting report of this court fight." Gross, University Professor of Life Sciences emeritus at the University of Virginia, is the author, with **Barbara Forrest**, of *Creationism's Trojan Horse: The Wedge of Intelligent Design* (New

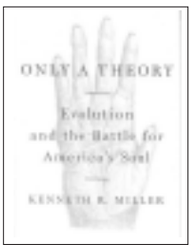


York: Oxford University Press, 2007).

A number of NCSE members wrote about the supposed martyrs featured in the creationist movie *Expelled* (to be discussed in detail in a future issue of *RNCSE*) for *Skeptic* (2008; 14 [2]). Following Michael Shermer's overview, "Ben Stein's blunder" (52–5), **Lauri Lebo** presented the facts about Guillermo Gonzalez's failure to receive tenure at Iowa State University (56–7), **Ed Brayton** discussed Richard Sternberg's complaints of persecution at the Smithsonian's National Museum of Natural History (57–8), and NCSE's **Carrie Sager** and **Andrea Bottaro** presented the facts about Caroline Crocker's not being rehired at George Mason University and Northern Virginia Community College (59). Versions of these were previously published by e-Skeptic and are available online at <http://www.skeptic.com/eskeptic/08-04-17.html> and <http://www.skeptic.com/eskeptic/08-04-23.html>. NCSE Supporter **Kenneth R Miller** summed up (60–1): "*Expelled* is a shoddy piece of propaganda aimed at propping up the scientific failures of ID by playing the victim card. It deceives its audiences, libels the scientific community, and contributes mightily to a climate of hostility not just to evolution, but to science itself." Of interest in the same issue of *Skeptic* are David Ziegler's "Predicting evolution: How likely is it that human-level intelligence will evolve again?" (24–7); Michael Shermer's "The chain of accidents and the rule of law: The role of contingency and necessity in the evolution of higher intelligence" (28–35); Kenneth W Krause's review of **Daniel J Fairbanks**'s *Relics of Eden: The Powerful Evidence of Evolution in Human DNA* (Amherst [NY]: Prometheus, 2007), which described it as "a truly commanding and no doubt timely illumination of human origins" (63–5); **Norman Levitt**'s review of John Allen Paulos's *Irreligion* (67–9); Massimo Pigliucci's review of Eugene Goodheart's *Darwinian Misadventures in the Humanities* (70–2); and Michael J Booker's review of Michael Dowd's *Thank God for Evolution!* (74–5).

Quite a few people associated with NCSE participated in "Evolution vs creationism in the classroom: Evolving student attitudes," presented at the annual meeting of the Society for Integrative and Comparative Biology, January 2–6, 2008, at San Antonio, Texas, organized by **Eric Lovely** of Arkansas Tech University. Lovely spoke on "Teaching evolution: Evolving student attitudes"; **Steven Verhey** spoke on "Update on the effect of engaging prior learning on student attitudes toward creationism and evolution"; Linda C Kondrick spoke on "Thomism and science education: History informs a modern debate"; Sam Donovan spoke on "Tree reasoning in evolution education"; **Brian Alters**, a member of NCSE's board of directors, spoke on "Teaching evolution in higher education"; John R Jungck and Anton Weisstein spoke on "Synergistic Evolutionary LEarning Consortium: evolution in acTION: A NESCent working group"; **Craig E Nelson** spoke on "Teaching evolution effectively: A central dilemma and alternative strategies": **Kevin Padian**, president of NCSE's board of directors, spoke on "How to get coverage of major evolutionary adaptive changes into textbooks and curricula"; **Barbara Forrest**, a member of NCSE's board of directors, spoke on "Still creationism after all these years: Recognizing and counteracting intelligent design"; and NCSE's executive director **Eugenie C Scott** spoke on "Creation science is alive and well." A number of papers based on these presentations subsequently appeared in the August 2008 issue of SICB's journal *Integrative and Comparative Biology*: Lovely and Kondrick's "Teaching evolution: Challenging religious preconceptions" (48: 164–74); Padian's "Trickle-down evolution: an approach to getting major evolutionary adaptive changes into textbooks and curricula" (48: 175–88); Forrest's "Still creationism after all these years: Understanding and counteracting intelligent design" (48: 189–201); Kondrick's "Thomism and science education: History informs a modern debate" (48: 202–12); Nelson's "Teaching evolution (and all of biology) more effectively: Strategies for engagement, critical reasoning, and confronting misconceptions" (48: 213–25); and Briana E Timmerman, Denise C Strickland, and Susan M Carstensen's "Curricular reform and inquiry teaching in biology: Where are our efforts most fruitfully invested?" (48: 226–40).

Randy Moore contributed a guest editorial entitled "How old is earth?" to *The American Biology Teacher* (2008 Aug; 70 [6]: 326–7), in which he discussed how the Answers in Genesis museum endorses Archbishop James Ussher's 17th-century estimate of the age of the earth. "Today," he commented, "people who base their knowledge on scientific evidence instead of superstition know that earth is approximately 4.55 billion years old. We know this not from revelation or assumptions about when fruit appeared on trees in the Garden of Eden, but from testable scientific observations." Moore, a recipient of NCSE's Friend of Darwin award in 2004, is Professor of Biology at the University of Minnesota, Twin Cities. Also of interest in the same issue of *The American Biology Teacher* is **William D Stansfield**'s "Teaching Mendelism" (345–9), offering information about Mendel's seminal paper of 1866 to aid teachers in teaching genetics, and a review (375) of **Nina G Jablonski**'s *Skin: A Natural History* (Berkeley [CA]: University of California Press, 2006), describing it as "a comprehensive, clear and fascinating read."



PZ Myers reviewed NCSE Supporter **Kenneth R Miller**'s latest book, *Only a Theory: Evolution and the Battle for America's Soul* (New York: Viking, 2008), for *Nature* (2008; 454: 581–2). "Miller's new book *Only a Theory* is a tour of creationist misconceptions about evolution, such as the one referred to in the book's subtitle — a creationist predicted an inevitable vic-

From the World-Wide Flood to the World Wide Web: Creationism in the Digital Age.

Stephen C Burnett

INTRODUCTION

Recent research has shown strong support for science among the public in the US (National Science Board 2006). At the same time, this research shows that this same public is generally not well-informed about scientific issues (National Science Board 2006). In fact, the NSB report concludes that "the public's lack of knowledge about basic scientific facts and the scientific process can have far reaching implications" (National Science Board 2006). This problem is not limited to adults, as tests of scientific literacy rate US students below the level of their counterparts in many other countries (National Science Board 2006). In particular, understanding of evolutionary biology is especially poor among Americans (Miller and others 2006), and it seems to be an issue from grade school (Michigan House Civics Commission 2006) to college (Holden 2006a). While this issue exists in other countries, the United States is the arguably the developed nation where the problem is most severe (Lazcano 2005; Miller and others 2006). Clearly, public perception of evolutionary biology is out of line with the actual state of science, and efforts to correct this should be a high priority.

One potential source of help is the World Wide Web, a venue that allows the dissemination of information to a wide audience quickly and cheaply. By any measure, the growth of the Web has been explosive (Zakon 2005), resulting in the ability of an individual to put up a site dedicated to any topic. Due to this growth, the current generation of students has grown up with the Web as a major part of their lives (Day and others 2005). In fact, with the advent of search engines, the Web has become *the* place to

Stephen Burnett is an associate professor of biology at Clayton State University in Morrow, Georgia. He teaches courses in evolution, vertebrate anatomy, animal behavior, and general biology. His research interests include public education and various aspects of animal behavior.

tory in the Dover trial because evolution is 'only a theory,'" he wrote. Myers described the book as "a celebration of the power of evolutionary theory to explain our existence. Miller is a fine writer who sharply addresses the details of the arguments about intelligent design creationism," although he took issue with Miller's diagnosis of the distinctively American nature of anti-evolutionism: "To call US citizens more independent-minded than European citizens flatters the creationists too much and demeans Europeans." Myers is Associate Professor of Biology at the University of Minnesota, Morris; he also runs the popular blog Pharyngula (<http://www.scienceblogs.com/pharyngula>).

NCSE Supporter **Michael Ruse** recently reviewed three books on the philosophy of biology for *American Scientist* (2008 Jul/Aug; 96 [4]: 340): William C Wimsatt's *Re-engineering Philosophy for Limited Beings*, Roger Sansom and Robert N Brandon's collection *Integrating Evolution and Development*, and NCSE Supporter **Elliott Sober**'s *Evidence and Evolution*. Reviewing the progress in the field, Ruse comments approvingly, "things have changed very much for the better ... I want to congratulate those philosophers of biology who have tried to be relevant to science on their solid successes." He adds, "But I also want to note that those oriented to more traditional philosophical issues, such as epistemology and ethics, have produced some terrific thinking. Elliott Sober, a philosopher of science at the University of Wisconsin-Madison, has long been a leader in this school, and his latest work, *Evidence and Evolution: The Logic Behind the Science*, shows why he commands our attention." Ruse found Sober's arguments against "intelligent design" particularly interesting, although he notes "I am not at all sure that I agree with his argumentation." Ruse teaches philosophy at Florida State University.

AUTHOR'S ADDRESS
Glenn Branch
NCSE
PO Box 9477
Berkeley CA 94709-0477
branch@ncseweb.org

begin finding information on just about any topic (Barrie and Presti 1996; Underwood 2004). As access to the Internet has increased, particularly in schools, the Web has come to be used more and more as an educational resource, where students will turn to find the answers to questions on exams, term papers, and class assignments (Day and others 2005). Because the Web can be a cheaper way to disseminate and access material compared to traditional forms of publishing (Ciolek 1997), it has become mandatory that any group with information to share should have a presence on line.

As in other areas, the controversy between those who subscribe to various forms of creationism and those who support evolutionary science has moved onto the Internet. While the most visible area of the creationism/evolution (C/E) debate is the ongoing struggle to use political or legal action to disrupt the teaching of evolution in classrooms (Pew Forum nd; Associated Press 2004; Mervis 2005; Annas 2006; Bhattarcharjee 2006; Holden 2006a), a large part of the ideological debate is presented on the Web as well. The purpose of this paper is to develop a basic understanding of the state of the C/E debate on the Internet and make some observations as to how the Web portion of this debate has changed in the last several years. The vast amount of information available on the Internet and its constantly changing nature make a complete review of the state of the Web fruitless. Instead, my purpose is to examine what a naïve individual might find when searching for information on creationism or evolutionary biology. For this reason, there is no content analysis of particular sites to rate their accuracy or objectivity; this would not be something that a naïve individual would be able to ascertain. Given the political nature of this debate, the individuals involved on either side are unlikely to be swayed by opposing arguments, but the information presented on-line could become the basis for an individual's developing a better (or worse) understanding of the nature of evolutionary science. For that reason, I have focused on the websites that would be found using particular queries that students might use at the beginning of a search for information. These methods were first applied in 1999 and then repeated with minor changes in 2005. This paper will focus on the results from 2005, but I will also discuss comparisons between the results from the two years.

METHODS

All searches were run using the Metacrawler internet search engine (<http://www.metacrawler.com>) because it engages several different search engines to provide hits from a larger proportion of websites than would be possible with a single search engine (Lawrence and Giles 1998). Today's more popular Google.com™ has existed in one form or another since 1998, (Google, Inc 2006), but searches on Google often return million of hits for a search, while Metacrawler returns a much smaller number. For example, a Google search for "Charles Darwin" generated approximately 11 400 000 hits, while Metacrawler listed only 96. Furthermore, the search algorithm used by each search engine and its particular method of ranking and reporting hits to each search introduce bias into the results, making a direct comparison nearly impossible: there is no way to determine exactly what methodology a search engine uses. Therefore, these data should not be taken as a representation of the "true" state of the Internet. Instead, these results should be taken as a sampling of information that could be found when searching the Web — as someone unfamiliar with evolutionary science might experience.

After running each query, the first results page was saved to allow me to browse the sites in it. Only the first 20 sites listed by each query were examined both to decrease the number of sites to examine and to get a list of sites that were the easiest to find (and most relevant to the experience I was trying to simulate). I conducted searches on a number of different search terms that consisted of phrases that relate to the C/E debate as well as the names of prominent individuals on both sides (Table 1). The search terms were chosen arbitrarily, but an attempt was made to include the basic terms that apply (for example, "creationism" and "evolution") as well as finding sites that were specifically related to teaching these concepts (such as, "teaching creationism"). The search engine was told to report a match only if the exact phrase in the query was found. Many of the results potentially overlapped, as a site found for one query might also be listed in response to several others. Because search engines rate and order the sites that match the query based on a variety of factors, including the number of times the search term is found on the page and the proximity of multiple search terms, there is no guarantee that closely related searches would identify the same sites as the top 20.

All 20 stored hits for each query were examined to classify them into a number of different categories. The classification system I used reflects my own impressions, but as much as possible, I used the information provided by each site to choose its classification. The primary division was into pages that were either "for" or "against" one side of the debate. Specifically, I defined a site as "pro-creationism" if it either rejects evolution entirely or requires that evolution be guided by an intelligent force — this includes young-earth creationists, "intelligent design" proponents, and *some* theistic evolutionists (for example, Malina 2006). A "pro-evolution" page is one that accepts the evidence in support of the theory of evolution and supports the scientific method as a mechanism for increasing our understanding about the world without trying to include non-scientific ideas. The important factor in the classification was how authors described how the world works. The question of religion was not intended to be a factor in this study, but due to the fact that religion is the driving force behind creationism, it is not possible to ignore religion completely when discussing the results. This classification system did not require that a pro-evolution site espouse atheism, because a page that only tried to prove what could be supported by scientific evidence was still classified as pro-evolution, regardless of the religious beliefs of the author (for example, Morton 2000).

continued on page 23

Ask About Evolution Before Election Day

Stan Braude

Elections are one case in which public opinion has an effect on science, especially education. Unless a contest is specifically for an office that affects curriculum or science education standards, the candidates' views on evolution and evolution education may go unmentioned. However, public officials in all elective offices can affect policies, budgets, and enforcement of standards. After the election of "stealth" candidates around the country in recent years, I have taken every opportunity to ask candidates the following direct question:

Why do we teach evolution in our schools and would you support adding creationism to the curriculum?

This not only helps uncover stealth candidates in school board elections, but also shows whether a candidate is a rational thinker or a dogmatic hack. Candidates often try to hedge bets (especially if they do not know the stance of the person who is asking the questions). Here are a few common answers that should raise suspicions:

More than 80% of Americans believe in teaching both evolution and creationism to our kids, so both should be taught.

Evolution, creationism, and "intelligent design" should be taught.

Teaching creationism is acceptable if local authorities agree.

Evolution and creationism are competing theories, or neither evolution nor creationism is a scientific theory.

Since we have a diverse community, different theories should be taught.

Evolution is just a theory, not a law like the law of gravity.

Of course, a candidate who understands science will know that evolution is taught because it is a fundamental scientific theory in biology. And I am often pleasantly surprised to find candidates who answer that creationism could be taught in comparative religion, philosophy, or in history (or history of science) classes, but not in a science course as a scientific theory.

For candidates who seem to want to defend sound science education, it might help to provide them with background on evolution education issues so that they present a more articulate, accurate, and incisive counterpoint to empty creationist slogans.

Law and theory

The confusion over the status of evolution as "just a theory" rather than a law (like the law of gravity) is based on a misunderstanding of these terms. Physicists today still work on and discuss gravitational theory. They do not question whether gravity exists; they investigate how and why it works the way it does. Similarly, biologists working on evolutionary theory today know that evolution is a fundamental principle used in explaining the living world.

Hypothesis and experimentation

Even though we cannot move the earth or change its orbit, we can still test the hypothesis that gravity holds the earth in orbit around the sun by making careful astronomical observations and testing whether they invalidate the predictions of the theory. Similarly, we test hypotheses about evolutionary history by making observations and testing whether they match the theory's predictions. Even though we cannot go back in time, we can still test the theory.

Evolution a theory in crisis?

Ideological opponents of evolution often promote disagreements among scientists about evolution as evidence that evolution is a theory in crisis. But when scientists disagree about evolution, it is about the *details* of a set of evolutionary relationships or the relative influence of different mechanisms, not about whether evolution occurs and has resulted in the biodiversity we see on earth today.

Teaching good science

We teach evolution in our schools because it is a *fundamental* theory in biology. It explains the patterns of similarities and differences that we see in all living systems — both present and past. Biologists use this information to understand, and solve important problems in medicine, public health, conservation, agriculture, nutrition, and aging. Failing to teach our students the best science available would be a terrible disservice to them — and to future generations.

Does everyone have a right to an opinion?

The majority of Americans could not explain how internal combustion engines work, but plenty are happy to offer advice if your car breaks down. In this case, the reasoning of one trained mechanic is more valid than the opinions of 100 biologists. The mechanic may be wrong some of the time, but his judgment is based on his training and experience. I don't ask my biology teacher how to fix my car and I don't ask my mechanic what to teach in a biology class.

When I provided NCSE materials to local school board candidates, at least one creationism supporter changed her answers in the next public forum. While she personally believed in the biblical account of creation, she publicly stated that evolution was the only theory appropriate for a science classroom.

Often, there are hints about the candidates' positions on science- or evolution-related issues on a campaign website or in campaign literature. Sometimes, these use the coded terms in my list to convey their messages. For local offices, party platform and position papers are less likely to be directly related, but they also can be used as background for questioning the candidate. However, there is nothing more effective than questioning the candidate face to face — and in front of a microphone or camera whenever possible. Alternatively, if you can reach the candidate (much more likely in a local race, of course) or the candidate's staff on the phone, *you* can spread the word about the candidates' positions.

Small local elections usually do not attract media attention, so it is important to ask questions in a public forum. Even so, creationism might not become an issue outside those public meetings with the candidates. However, it is also possible to engage the media with effective letters to the editor (see Mary Lou Mendum's tips for effective letter-writing at <http://www.ncseweb.org/resources/articles/8069_10_tips_for_writing_letters_to_3_19_2001.asp>) or to share your comments with reporters from broadcast media (see Martha Heil's "How to talk to TV media" in *RNCSE* 2007 Sep–Dec; 27 [5–6]: 27). I encourage all supporters of evolution to ask the "evolution question" of all candidates — not just those for local school board. I would rather educate, or if necessary "out", candidates before election day than have to fight them afterwards.

Stan Braude is Research Assistant Professor in Biology at the University of Missouri, St Louis. He is a long-time supporter of evolution education.

Author's address
Stan Braude
Biology Box 1137
Washington University
One Brookings Drive
St Louis MO 63130
braude@biology2.wustl.edu

The Evolutionary Reference desk

"I think, for the rest of my life, I shall refrain from looking up things," the novelist and poet Carolyn Wells wrote in her autobiography. "It is the most ravenous time-snatcher I know. You pull one book from the shelf, which carries a hint or a reference that sends you posthaste to another book, and that to successive others. It is incredible, the number of books you hopefully open and disappointedly close, only to take down another with the same result." Perhaps she would have been less disappointed in today's crop of meticulously researched, clearly written, and often lavishly illustrated reference books on the history of life, evolutionary biology, and the creationism/evolution controversy — although she would probably have still found herself engrossed by them. Certainly readers of *RNCSE* will be! The following books are now available through the NCSE website: <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.

The History of Life

The Book of Life: An Illustrated History of the Evolution of Life on Earth, second edition
edited by Stephen Jay Gould
The Book of Life, now in its second edition, provides nothing less than it promises in its title: a detailed account of the history of life on earth over the last four billion years. J John Seposki Jr, Michael Benton, Christine Janis, Christopher Stringer, and Peter Andrews, under the general editorship of NCSE Supporter Stephen Jay Gould, are responsible for the thoroughly understandable text; the vivid and compelling illustrations are the work of John Barber, Marianne Collins, Ely Kish, Akio Marishima, and Jean-Paul Tibbles. *Palaeontologia Electronica*'s reviewer wrote, "There is much of interest here for the professional, and a wealth to be discovered for the interested general reader."

The Tree of Life: A Phylogenetic Classification
by Guillaume Lecointre and Hervé Le Guyader
Reviewing *The Tree of Life* for *RNCSE*, Kevin Padian wrote, "*The Tree of Life* is a terrific compendium of the conclusions of thirty years of research and standardization by thousands of scientists around the globe. It is clearly written, logically organized, and beautifully illustrated. In short, it is one-stop shopping for anyone with questions about where a given group of organisms fits on the tree of life, what characteristics put it there, and how we know all this. ...This book deserves wide distribution and use in libraries and classrooms, as well as among professionals and students of biology."

The Story of Life
by Richard Southwood
The Story of Life, based on the eminent zoologist Richard Southwood's lectures to first-year students at Oxford University, manages to review the history of life, from its earliest beginnings to the present day — and it even offers a glimpse into the future. It is generously illustrated with line drawings and maps, too! "This remarkable book succeeds, within less than 300 pages, in summarizing everything essential about all living creatures for more than three billion years. If you are looking for one convenient, reliable, highly readable reference to replace your whole library, this is it," writes Jared Diamond.

The Variety of Life
by Colin Tudge
"[A]n eye for classification is a constant reminder that nothing on this planet is as homely as it seems — there are several thousand million years of evolutionary drama behind everything that moves and breathes," Colin Tudge explains in *The Variety of Life*, which provides both a primer on systematics and (in the words of the book's subtitle) a survey and a celebration of all the creatures that have ever lived. *The Variety of Life* was praised by Edward O Wilson as "a valuable introduction to the higher classification of organisms and an easily accessible reference work to the entire spread of biodiversity."

Evolution in General

Keywords in Evolutionary Biology
edited by Evelyn Fox Keller and Elisabeth A Lloyd
The editors of *Keywords in Evolutionary Biology* commissioned leading biologists, historians of biology, and philosophers of science to explain in detail a host of concepts central to evolutionary biology, from adaptation to unit of selection. The book includes essays by Richard Dawkins, Stephen Jay Gould, Daniel J Kevles,

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

Motoo Kimura, Philip Kitcher, Michael Ruse, Elliott Sober, Mary Jane West-Eberhard, and David Sloan Wilson. Ernst Mayr exclaimed, "What a splendid idea to have a critical discussion by established experts of the key words used in recent controversies in evolutionary biology. This helps the understanding of these controversies enormously."

The Oxford Encyclopedia of Evolution
edited by Mark D Pagel
A monumental reference work, with over 1300 pages in two volumes, *The Oxford Encyclopedia of Evolution* presents the essentials of evolutionary biology in 370 original articles written by leading experts, accompanied with hundreds of tables, charts, graphs, maps, and other illustrations, as well as bibliographies, cross-references, and an index. The reviewer for *Trends in Ecology & Evolution* concluded, "Throughout the diverse contributions, a strong case could be made that the authors are among the best that could have been chosen to describe their respective fields. … In short, this will be an excellent reference work for those in any field of evolution."

Icons of Evolution:
An Encyclopedia of People, Evidence, and Controversies
edited by Brian Regal
From the publisher: "Students and the general public are frequently confronted with contradictory and confusing claims about the people, ideas, and artifacts that were essential in the development of the science of evolution. Where can they find accurate and understandable information on these important concepts? *Icons of Evolution* comprises twenty-four in-depth essays on the most famous ideas, artifacts, people and places of evolutionary biology. Dinosaurs, Neanderthals, Charles Darwin, peppered moths, carbon dating, the fossil record, and more, are explained by some of the most respected scientists, historians, and philosophers of evolution in the world."

Encyclopedia of Evolution
by Stanley A Rice
Reviewing *Encyclopedia of Evolution* for *RNCSE*, Tim M Berra wrote, "It is not often that one reads an encyclopedia from cover to cover, but this task was more enjoyable than onerous. … Rice's coverage is broad, interesting, relevant, and informative. If you want examples of *Convergent Evolution* or a primer on *Cladistics*, *Coevolution*, or *Creationism*, this is a good place to begin. Reading this book would be excellent preparation for graduate school general exams. It can serve as a ready reference for science journalists, teachers, school board members, and the intelligent layperson." The author, a member of NCSE, teaches at Southeastern Oklahoma State University.

Creationism and Evolution

Anti-Evolution:
An Annotated Bibliography
by Tom McIver
Containing bibliographical data and brief objective descriptions of almost 2000 anti-evolutionist books, pamphlets, and tracts, and with useful biographical data on their authors, *Anti-Evolution* is invaluable for the serious student of creationism. Writing in *Nature*, Euan G Nisbet said, "Tom McIver has provided us with a splendid bestiary of anti-evolution ideas. … It is a fascinating work … either for a chuckle or, on those unpleasant occasions, to face up to a nightmare on the rampage." Published in 1988 and reissued in paperback, with a new introduction, in 1992 and again in 2008. McIver is a longtime member of NCSE.

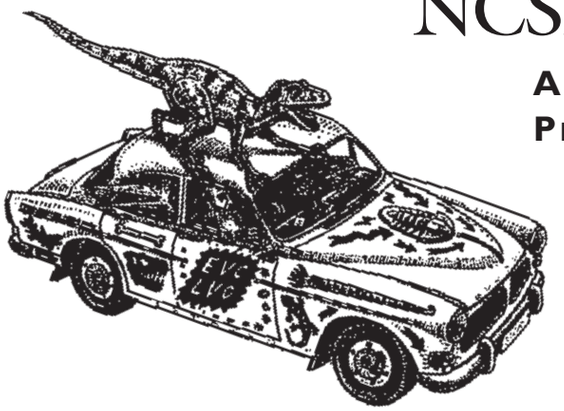
Evolution in the Courtroom:
A Reference Guide
by Randy Moore
Recounting the legal history of the creationism/evolution debate, from the Scopes trial on, *Evolution in the Courtroom* also offers extras such as excerpts from key legal documents, a detailed chronology, and profiles of the major players, such as Frank White, the Arkansas governor who signed a "balanced treatment" act without even reading it. The reviewer for *American Reference Books Annual* praised *Evolution in the Courtoom* as "a wonderful addition to a school library, preferably high school, as well as in a science classroom reference library." Randy Moore is a member of NCSE and received its Friend of Darwin award in 2004.

More than Darwin:
An Encyclopedia of the People and Places of the Evolution–Creationism Controversy
by Randy Moore and Mark D Decker
More than Darwin provides a carefully researched and lavishly illustrated account of over 500 people, places, and organizations that figure prominently in the creationism/evolution controversy, from Adam and Eve to Evelle J Younger (who, as attorney general of California in 1975, declared that "balanced treatment" acts were unconstitutional). The reviewer for *Library Journal* wrote, "It is a major source of information on the subject, covering the entire range of topics in the history of the debate. … This accessible resource is a great tool for anyone looking for short and concise background on the evolution–creationism controversy. Recommended for all public and high school libraries."

Evolution and Creationism:
A Documentary and Reference Guide
by Christian C Young and Mark A Largent
From the publisher: "[T]he evolution versus creation debate never goes away. The best way to understand these debates is to read the arguments of the individuals involved. This reference work provides over 40 of the most important documents to help readers understand the debate in the eyes of the people of the time. Each document is from a major participant in the debates — from the predecessors of Darwin to the judges of the influential court cases of the present day. The editors have included an introduction and analysis of each document that places it within historical and scientific context."

NCSE on the Road

A Calendar of Special Events, Presentations, and Lectures



Date October 31, 2008
City San Jose CA
Presenter Louise S Mead
Title Teaching Evolution in the 21st Century
Event California Science Education Conference
Time 12:00 noon
Location McEnery Convention Center Auditorium
Contact mead@ncseweb.org

Date November 11, 2008
City Dallas TX
Presenter Barbara Forrest
Title Why Texans Shouldn't Let Creationists Mess with Science Education
Event Presentation sponsored by the Texas Freedom Network
Time TBA
Location Southern Methodist University
Contact Val Benavidez, val@tfn.org

Date December 4, 2008
City Louisville KY
Presenter Eugenie C Scott
Title Not Over After Dover
Event Public lecture
Time 4:00 PM
Location University of Louisville
Contact Michael H Perlin, anthersmut@louisville.edu

Date December 5, 2008
City Louisville KY
Presenter Eugenie C Scott
Title Genie's Top 10 Ways to Teach Evolution Better
Event Talk to faculty
Time 12:00 noon
Location University of Louisville
Contact Michael H Perlin, anthersmut@louisville.edu

Date January 27, 2009
City Greenville NC
Presenter Eugenie C Scott
Title Darwin's Legacy in Science and Society
Event Lecture in the Voyages of Discovery series
Time 7:00 PM
Location East Carolina State University
Contact John A Tucker, Tuckerjo@ecu.edu

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

Join us at the National Center for Science Education

Membership in NCSE brings you:
- 6 issues of *Reports of the National Center for Science Education*
- Participation in NCSE's efforts to promote and defend integrity in science education

MEMBERSHIP INFORMATION

Name

Address

City State Zip

( ) ( )
e-mail Telephone Fax

Occupation (Optional)

☐ Check here if you do not want NCSE to share your name and address with other organizations

☐ Check here if NCSE may share your name with activists in your state

☐ Check (US dollars) ☐ Charge to: ☐ VISA ☐ Master Card ☐ AmEx

Credit card number Expiration Date

Name as it appears on card Signature

NCSE MEMBERSHIP

☐ One Year US: $30 Foreign Air: $39 _____
☐ Lifetime $600 _____
Tax Deductible Contribution to NCSE _____
TOTAL _____

continued from page 18

The next category I used to classify web pages was based on the individual(s) responsible for producing and maintaining the websites. A "professional" site was one that was produced by an organization that (in whole or in part) deals with issues of the C/E debate. This is contrasted with "personal" web pages that were developed by individuals without the site's being officially associated with an organization. This classification was not based on the credentials of the page author, but on the association between the author and any organization that might be supporting the website. For example, a web page written by a practicing biologist could be classified as a personal page if it were not representing the official view of a particular organization. This distinction was difficult to make in some cases due to the fact that the "stance" of the page and the identity of the author were not always clearly identified on the page retrieved by the search. To be conservative, I took the claims of the page author at face value, because an individual who knew nothing about the C/E debate would have no other way to decide on the stance of particular sites.

These two classifications were suitable for the majority of pages that I found, but a few required additional categories. In many cases, a page was developed by a group of authors as a sideline to their regular occupations. In this case, I used a category called "collaborative" to indicate a page that is developed by several different authors to address these issues without being the primary job of any of them. The best example of this is the Talk.Origins archive, which includes writings that have been posted to the newsgroup of the same name by different authors over the course of many years (Talk.Origins 2006). While work has clearly been expended to produce a page that has a consistent interface (including a search engine) the majority of information is based on postings from the newsgroup. A similar sort of site is found at About.com, which is a collection of articles and links moderated by individuals referred to as "guides." This site displays many of the characteristics that would be associated with a professional page, but given the wide-ranging attitudes of the different moderators and the mission of About.com (About.com 2006) I felt that the site as a whole is more collaborative. Three additional categories were used as well: 1) "library" sites were sites that allowed users to look up reference information on any topic, 2) "links" described pages that consisted solely of a list of hyperlinks to information on the topic, but having no content of their own, and 3) "encyclopedias" included websites (such as Wikipedia.org) that serve as a collection of information about many topics. My initial inclination was to exclude these types of sites, but in my experience as an educator, these are among the most common reference sites that students use in their online searches.

When classifying sites, I wanted to avoid skewing the results by counting the same site multiple times. There are two ways that this could occur, which I called "duplicated" and "repeated" sites. A site was considered a duplicate if it was found multiple times within a single search. In general, one would not expect the same page to be reported as a hit in the same search, but given the fact that most websites consist of a single home page with multiple subpages, it is easy to see how several pages on a single site might be listed as hits for a single query. In this case, only one of the hits would be counted for that search due to the fact that once a particular page on a site is found, it is generally easy to get to the home page for that site, leading to all the different pages it might contain. A repeated site was one that was found by different searches. For each repeated site, only one hit was counted in the final classifications because the classification would only need to be done once, regardless of how many different searches returned that particular site. Thus the number of sites in the final classification was further decreased to count each site only once, no matter how many queries linked to that site.

After removing duplicate and repeated sites, I examined the remaining sites to eliminate those that were not relevant to the C/E debate. Search engines have improved their ability to provide results relevant to a user's queries, but they often still provide results that are not suited to the user's needs. The presence of a particular search term on a given page is no guarantee that the page actually contains useful content. For that reason, I further narrowed the list of websites by excluding those that were not appropriate using a variety of criteria.

Any site that was not related to the topic of evolution or creationism was removed entirely from the results. There were a number of different reasons why such sites would not be useful for the purpose of this study. The largest single cause for a site's exclusion was that its main purpose was raising money as opposed to providing information. This includes sites such as Amazon.com and other sites that may sell material related to the C/E debate, but are not involved directly. Because the purpose of this study was to describe the information that would be available to someone who knows little about this debate, it was my judgment that it is unlikely that a commercial site would itself be a primary source of information on the C/E debate.

Sites that primarily provided news reports were also rejected, because the purpose of these sites was not usually to inform readers about the scientific issues within the C/E debate. Due to the timing of my web searches, the majority of the news articles dealt with two issues. First, a report released in April 2005 by the Pew Forum on Religion in Public Life (40% of news pages addressed this report). Because this dealt with public opinion polling on a variety of issues concerning politics and religion, and because it only discussed public opinions on evolution or creationism, I felt that these sites were of limited use to someone seeking to learn about the facts of the C/E debate. The second set of reports dealt with ongoing political issues in school systems around the country including decisions by many school districts to challenge the accuracy of evolution in biology classes (40%). Again, these would be of interest to someone seeking information on public opinion and political issues, but these reports provided little or no factual information on the topics. In addition, many of these sites used reports from wire services, meaning that their text

Query	1999	2005	Change from 1999 to 2005
Teaching creationism	55	91	+65.5%
Teaching evolution	59	43	-27.1%
Creationism	61	88	+44.3%
Creation science	57	99	+73.7%
Evolution	55	11	+83.6%
Darwinism	49	83	+69.4%
Young earth creationism	55	74	+34.5%
Intelligent design	N/A[a]	94	N/A
Irreducible complexity	51	79	+54.9%
Anti-evolution	37	86	+32.4%
Charles Darwin	53	96	+81.1%
Richard Dawkins	51	79	+54.9%
William Dembski	N/A[b]	85	N/A
Duane Gish	54	N/A[c]	N/A
Stephen Jay Gould	54	92	+70.4%
Michael Behe	38	35	-7.9%
Phillip Johnson	50	96	+92.0%
Total # of hits	**779**	**1321**	**+69.6%**

TABLE 1: Summary of search results for each query. Only the first 20 hits for each query were examined. These numbers indicate the total number of hits for each query, without regard to duplicates, repeats, or the appropriateness of a particular web page.

[a]In 1999 the top 20 hits for this search all dealt with the design of computer networks, so this search term was discarded.

[b]Because Dembski's first work on the C/E debate was published in 1998, he was not included as a search term in 1999.

[c]Due to the increase in the importance of ideas about "intelligent design" and a concomitant decrease in the importance of young-earth creationism, Gish was not used as a search term in 2005. This is also due to the decrease of his importance as new creationists are taking up the battle.

was identical or nearly so. The remaining 20% of the news reports linked to sites that were no longer available or required a subscription to access them. Based on this breakdown of sites, it seemed better to exclude them all to focus on other areas where someone researching the C/E debate could find more substantive information.

Similarly, lecture transcripts, interviews, biographies, book reviews, or discussions of the political or social views of the particular individuals named in the search queries were removed from consideration as well, unless they were part of a larger website about the C/E debate. A number of websites that function as discussion boards on various issues were excluded, because they were sites that listed the opinions of the various authors on many topics, not providing specific information on the C/E debate.

Additional difficulty arose due to the ease of publishing on the Web and the lack of oversight on the quality of the information (Barrie and Presti 1996). Due to this fact, some sites were excluded for poor quality information. Such sites might claim to address the C/E debate, but often seemed to be tracts on metaphysics instead of biology. These sites were usually accompanied by esoteric philosophical discourse without having a realistic understanding of the scientific process (for example, Davis 2005; Mamas 2005). Last, between the time I ran the queries and finished checking the web pages, some of the pages that were listed in the search were no longer accessible, a common problem when dealing with websites (Dellavalle and others 2003), so their content could not be examined and those sites had to be excluded. Once the final set of sites was determined, the remaining pages were examined to classify them.

RESULTS

In 1999, 779 hits were reported for 15 searches, and that number had expanded to 1321 hits for 16 searches in 2005. Only the first 20 hits were examined for each query giving a total of 300 sites in 1999 and 320 sites in 2005.

After duplicates were eliminated, so that each site was included for a particular search only once, there were 249 sites in 1999 (17.0% duplicates) and 207 in 2005 (35.3% duplicates). Further excluding repeated sites so that each site was only counted once resulted in 212 sites in 1999 (14.9% of non-duplicate sites were repeated) and 140 in 2005 (32.4% were repeated sites).

When applying the criteria that were used to exclude sites that were not appropriate for the purposes of this study, a total of 138 sites (65.1% of the remaining sites) were excluded in 1999 while 39 were excluded in 2005 (27.9%). Of particular interest in 2005 was the large number of commercial sites (including on-line retailers and auction sites) because most of these sites did not seem to have any relationship to evolution at all. It is not clear why these sites ended up in the top 20 results for some of the queries. The end result of this process was to give 74 "acceptable" sites in 1999 and 101 in 2005.

Because only the first 20 hits were examined, the analysis is properly restricted to examining trends between the two samples. For example, there is a general trend for an increase in the number of responses to the queries. As Tables 1 and 2 show, the number of hits for individual queries, as well as the total set for all queries, significantly increased between 1999 and 2005. There was an increase of 69.6% for the total number of hits and an increase of 36.5% when only examining the acceptable hits for each search. This increase in the number of sites is not particularly surprising, given the growth of the Web in the same time (Zakon 2005). In addition, for both years the total number of pro-creationist sites was higher, due to the fact that the number of professional pro-creationist sites is significantly higher than professional pro-evolution sites.

DISCUSSION

The general increase in the number of hits to the various queries is probably affected by a number of factors, including the general growth of the Web, the expansion of C/E sites onto the Web, and changes in search engines. There were both an increase in the number of acceptable sites and also those that were excluded as unacceptable. The fluid nature of the Web makes any analysis on particular searches at particular times inexact, but the differences between the two samples make some qualitative trends discernible.

The first is the greater number of duplicate and repeated sites reported in the top 20 hits in 2005. This could have been due to consolidation among these websites so that there are fewer sites available to find. Another possibility is that there has been no change in the sites, but that there has been a change in the search engines, so that the sites they report are giving a different representation of the Internet. In fact, these options are not mutually exclusive, and it may well be that both the websites and the search engines are changing to produce this trend. When looking at sites that were not duplicated or repeated, there were more acceptable sites in 2005 (101, which is 31.6% of the 320 sites that I originally recorded) than 1999 (74, which is 24.7% of the 300 recorded), which may indicate that the sites that were being reported were in fact more useful than those that had been reported in 1999.

When examining the acceptable sites, there was a greater number of creationist sites in both years, but in 1999 there were roughly twice as many pro-creationist sites as pro-evolution sites. By 2005, there were four pro-evolution sites for every five pro-creationism sites. This is an encouraging trend because it suggests that there has been a general increase in the number of pro-evolution websites or at least an increase in the likelihood that these sites will be found by the search engines. This may mean that people searching the web will find more evolution sites than they would have in the past. Of particular interest is the fact that the total *number* of pro-creationist websites that were found did not change between the two years while the number of pro-evolution sites increased.

While more sites were reported to the queries in 2005, the actual usefulness of the queries is affected by the presence of repeated sites. In 1999, 57 sites were only found by one of the search queries, while the remaining sites were reported by as many as six different searches. Of the repeated sites, the vast majority were found by two or three queries. In 2005, the majority of the sites were also only found once, but one site (Wikipedia) was repeated for every search while another site (Talk.Origins) was repeated 10 times. These results are probably due to the fact that these particular sites both consist of large collections of pages that cover many of the topics that were used as search queries. The remaining sites were repeated no more than six times. This difference between the two years might be a result of changes in the makeup of the websites, or it could be due to the fact that the search engines classified the pages differently in the two years. It is also affected by the fact that Wikipedia wasn't online until 2001, so that the results for that site cannot be compared between the two years.

I had particular interest in hits that resulted to queries that included "teaching" as part of the search term because they would seem to address the idea of providing instruction as opposed to simply refuting the opposing side of the debate. A number of sites included teaching materials that could be used to teach in schools or as part of a home schooling curriculum. In both the case of pro-evolution (National Academy of Sciences 1998; WGBH Educational Foundation 2001) and pro-creationist sites (Answers in Genesis 2006a; Let Us Teach Kids 2002), the teaching material available on the web often included general curricula and study guides as well as online videos and/or DVDs that can be used in the classroom.

Type of Web Page	1999	2005	Change from 1999 to 2005
Personal Web page – pro-creationist	9	8	-11.1%
Personal Web page – pro-evolution	9	17	+88.9%
Collaborative Web page – pro-creationist	0	1	N/A
Collaborative Web page – pro-evolution	3	4	+33.3%
Professional Web page – pro-creationist	37	37	0%
Professional Web page – pro-evolution	12	16	+33.3%
Library	2	3	+50.0%
Links page	2	3	+50.0%
Encyclopedia	0	12	N/A
Total	**74**	**101**	**+36.5%**

TABLE 2: Classification of Web pages after removing duplicated, repeated, and inappropriate sites.

Overall, there was a larger total number of creationist sites, due to the large number of pro-creationism websites that were classified as professional. As might be expected, most of these sites are associated with organizations that have an explicit religious agenda, such as Answers in Genesis (Answers in Genesis 2006b) and the Institute for Creation Research (Institute for Creation Research 2006). Since 1999, however, there has been an increase in sites that attack evolution but claim to do so without reference to a particular religious belief (for example, Access Research Network nd; Discovery Institute nd). These organizations are most likely to be attacking evolution using the ideas of "intelligent design". As this is the form of creationism that is popular at this time (Mervis 2005, 2006; Bhattarcharjee 2006) it comes as no surprise that there are many sites devoted to this topic. Given recent events favoring evolution over "intelligent design" (Bhattarcharjee 2006; Mervis 2006), it would not be surprising if the anti-evolution sites were espousing a new idea in a few years.

Another interesting observation was the number of personal websites dealing with this issue. There was a large number of personal pro-evolution sites in 2005 that helped balance the greater number of professional pro-creationist web pages. While these "personal" sites are maintained by individuals without any ties to an organization, these sites often provided content that matches or exceeds what is available on some of the professional pages (for example, Babinski 2005). Unfortunately, given the financial resources available to many creationist organizations, it is unlike-

ly that personal pages will be able to match professional creationist pages, but such personal pages still provide a useful way to cover the C/E debate.

Another important development was the introduction of Wikipedia in 2001 (Wikipedia 2006). This is a website that serves as an encyclopedia that can be edited by anyone with Internet access. Because the content of Wikipedia is determined by consensus among many individuals, that material can change without warning (Fisher 2005). At the current time, Wikipedia contains over 1 million articles in English and thousands more in other languages. This site is easy to search and contains information on the ideas of creationism and evolution. Unfortunately, the ability of anyone to edit these pages also means that they are of varying quality. While browsing the hits to my queries that came from Wikipedia, I found them to be fairly accurate, which matches results of a study published by the journal *Nature* (Giles 2005), but there is no guarantee that this will be maintained in the future. Given the opinion among a majority of Americans that creationism is equal or superior to evolution (Associated Press 2005), the modification of Wikipedia in consensus with majority opinion could easily lead to it containing incorrect information (Fisher 2005).

Future studies

This study has examined only the hits produced by the search engine and not the appeal or utilization of the sites themselves. A further analysis of this aspect of the search results could serve to improve the presentation of evolutionary biology on the Web so that we can be more effective at reaching those who are seeking information. While it is unlikely that any change in presentation will convince someone who has already determined which "side" he or she supports, it might still serve to convince those who have not made such a determination.

Due to the visual nature of the Web, sites that present the material in a way that is visually appealing may be more likely to attract the attention of someone looking for information (Zhang 2000; Becker and Mottay 2001; Lindgaard and others 2006). Obviously, it would be best if all sites present information accurately, but the methods used to present that information may be as important as factual accuracy. Good web design is becoming more important because Web users are coming to expect certain characteristics if a website is going to keep their attention (Skaalid 1999; Nielsen 2006). If some sites are more pleasing to view, then they may get more attention from users, leading to the impression that they have more validity. For this reason, future research should be directed at analyzing the sites to determine which designs are more effective.

Because this issue is a debate between two polarized camps, it should not come as a surprise that some sites specifically aim themselves at attacking the opposing viewpoint (for example, Discovery Institute nd, attacking evolution, or New Mexicans for Science and Reason nd, attacking creationism). A recent study showed that attacking false claims may actually increase how strongly people believe them (Schwartz and other 2007). Refuting creationism is a natural outgrowth of explaining how evolution works, but if too much time is spent attacking anti-evolutionary ideas, it can give the impression of being defensive, suggesting that evolution is a weaker idea. Given the generally low level of scientific literacy of the American public, there should be more online material that makes learning evolution easier (for example Brain nd), as it is imperative that people be educated about scientific methodology as a necessary step towards becoming informed citizens (Nowotny 2005).

Fortunately, it is possible to present information in an interesting and appealing way that still preserves its scientific integrity, otherwise, the books of Carl Sagan, Richard Dawkins, Jared Diamond, and Stephen Jay Gould would not be as popular as they are. Scientists need to be sure that we are working to make science more accessible while also defeating creationist ideas. If we spend excessive time refuting creationism, we may find that the time has been wasted, because resisting one form of creationism is a short-term benefit. Like Hercules facing the hydra, for every brand of creationism that is defeated, a new one develops. The recent successes in Kansas (Bhattarcharjee 2006) and Pennsylvania (Mervis 2005, 2006) have dealt a setback to the proponents of anti-evolutionary ideas, but it would be foolish to believe that the fight is over.

ACKNOWLEDGMENTS

I would like to thank two anonymous reviewers for helpful comments on an earlier version of this manuscript. I would also like to thank Andrea Wolfe and the students from EEOB710 for helpful discussions during the initial portion of this project.

REFERENCES

About.com. 2006. About — our story, welcome. Available on-line at <http://ourstory.about.com/>. Last accessed August 16, 2006.

Access Research Network. nd. Access Research Network. Available on-line at <http://www.arn.org/>. Last accessed November 16, 2005.

Annas GJ. 2006. Intelligent judging — evolution in the classroom and the courtroom. *New England Journal of Medicine* 354: 2277–81.

Answers in Genesis. 2006a. Answers academy curriculum: Biblical apologetics for real life! Available on-line at <http://shop5.gospelcom.net/epages/AIGUS.storefront/en/product/40-1-164?CID=12110&cSess=20051130779451854>. Last accessed November 30, 2005.

Answers in Genesis. 2006b. Answers in Genesis — creation, evolution, Christian apologetics. Available on-line at <http://www.answersingenesis.org/>. Last accessed October 8, 2005.

Associated Press. 2004. Georgia school official wants no "evolution". Available on-line at <http://www.foxnews.com/story/0,2933,109939,00.html>. Last accessed January 9, 2006.

Associated Press. 2005. Poll shows support for teaching "creationism". Available on-line at <http://www.msnbc.msn.com/id/9146879/>. Last accessed November 30, 2005.

Babinski ET. 2005. Creation vs evolution — the "cretinism vs evilution" series. Available on-line at <http://www.edwardtbabinski.us/babinski/cretinism-evilution-index.html>. Last accessed January 10, 2006.

Barrie JM, Presti DE. 1996. The World Wide Web as an instructional tool. *Science* 274: 371–2.

Becker SA, Mottay FE. 2001. A global perspective on website usability. *IEEE Software* 18: 54–61.

Bhattarcharjee Y. 2006. Evolution trumps intelligent design in Kansas vote. *Science* 313: 743.

Brain M. nd. How evolution works. Available on-line at <http://www.howstuffworks.com/evolution.htm>. Last accessed October 11, 2005.

Ciolek TM. 1997. ANU e-commerce/e-publishing issues. Available on-line at <http://www.ciolek.com/PAPERS/ECOMM/e-issues97.htm#print-epubs-costs>. Last accessed August 23, 2006.

Davis C. 2005. Idle theory. Available on-line at <http://www.idlex.freeserve.co.uk/>. Last accessed October 5, 2005.

Day JC, Janus A, Davis J. 2005. *Computer and Internet Use in the United States: 2003.* Washington (DC): US Census Bureau.

Dellavalle RP, Hester EJ, Heilig, LF, Drake AL, Kuntzman JW, Graber M, Schilling LM. 2003. Going, going, gone: Lost internet references. *Science* 302: 787–8.

Discovery Institute. nd. Center for Science and Culture — challenging Darwin's theory of evolution and promoting intelligent design. Available on-line at <http://www.discovery.org/csc/>. Last accessed January 10, 2006.

Fisher K. 2005. Wikipedia founder: "Don't cite". Available on-line at <http://arstechnica.com/news.ars/post/20051214-5768.html>. Last accessed February 12, 2008.

Giles J. 2005. Internet encyclopedias go head to head. *Nature* 438: 900–1.

Google, Inc. 2006. Google corporate information: Google milestones. Available on-line at <http://www.google.com/corporate/history.html>. Last accessed August 16, 2006.

Holden C. 2006a. Court revives Georgia sticker case. *Science* 312: 1292.

Holden C. 2006b. Darwin's place on campus is secure — but not supreme. *Science* 311: 769–71.

Institute for Creation Research. 2006. The Institute for Creation Research. Available on-line at <http://www.icr.org>. Last accessed August 20, 2006.

Lawrence S, Giles CL. 1998. Searching the world wide web. *Science* 280: 98–100.

Lazcano A. 2005. Teaching evolution in Mexico: Preaching to the choir. *Science* 310: 787–9.

Let Us Teach Kids. 2002. Biblical creation visuals. Available on-line at <http://www.letusteachkids.com/stories/storybag1.htm>. Last accessed October 8, 2005.

Lindgaard G, Fernandes GJ, Dudek C, Brown J. 2006. Attention web designers: You have 50 milliseconds to make a good first impression! *Behaviour and Information Technology* 25: 115–26.

Malina R. 2006. Metadynamics ministry: Metagenesis. Available on-line at <http://net.metadynamics.com/metagenesis.asp>. Last accessed May 19, 2006.

Mamas M. 2005. The resolution of the Darwinism/intelligent design conflict. Available on-line at <http://www.thegoldenfrog.com/darwinism_creationism.htm?c1=Darwin&source=Overture&kw=intelligent-design>. Last accessed November 16, 2005.

Mervis J. 2005. Dover teachers want no part of intelligent-design statement. *Science* 307: 505.

Mervis J. 2006. The Dover ID decision: Judge Jones defines science — and why intelligent design isn't. *Science* 311: 34

Michigan House Civics Commission. 2006. HB 4946 ("Evolution" in curriculum). Available on-line at <http://www.civicscommission.com/polls/pollResults.php?pollid=91>. Last accessed August 18, 2006.

Miller JD, Scott EC, Okamoto S. 2006. Public acceptance of evolution. *Science* 313: 765–6.

Morton GR. 2000. Why I left young-earth creationism. Available on-line at <http://home.entouch.net/dmd/gstory.htm>. Last accessed January 10, 2006.

National Academy of Sciences. 1998. *Teaching about Evolution and the Nature of Science.* Washington DC: National Academies Press. Available on-line at <http://www.nap.edu/readingroom/books/evolution98/>. Last accessed January 9, 2006.

National Science Board. 2006. *Science and Engineering Indicators*, vol 1. Arlington (VA): National Science Foundation.

New Mexicans for Science and Reason. nd. Icons of anti-evolution. Available on-line at <http://www.nmsr.org/iconanti.htm>. Last accessed October 5, 2005.

Nielsen J. 2006. Top ten mistakes in web design. Available on-line at <http://www.useit.com/alertbox/9605.html>. Last accessed September 21, 2006.

Nowotny H. 2005. High- and low-cost realities for science and society. *Science* 308: 1117–8.

Pew Forum. nd. Intelligent Design. Available on-line at <http://pewforum.org/docs/?DocID=114>. Last accessed November 16, 2005.

Schwartz N, Sanna LJ, Skurnik I, Yoon C. 2007. Metacognitive experiences and the intricacies of setting people straight: Implications for debiasing and public information campaigns. *Advances in Experimental Psychology* 39: 127–61.

Skaalid B. 1999. Multimedia & web page design principles. Available on-line at <http://www.usask.ca/education/coursework/skaalid/page/design/webdsgn.htm>. Last accessed August 20, 2006.

Talk.Origins. 2006. The Talk.Origins archive: Exploring the creation/evolution controversy. Available on-line at <http://www.talkorigins.org/>. Last accessed August 20, 2006.

Underwood L. 2004. A brief history of search engines. Available on-line at <http://www.webreference.com/authoring/search_history/>. Last accessed August 23, 2006.

WGBH Educational Foundation. 2001. *Evolution*: Online course for teachers: Teaching evolution. Available on-line at <http://www.pbs.org/wgbh/evolution/educators/course/>. Last accessed January 9, 2006.

Wikipedia. 2006. Wikipedia: About Wikipedia, the free encyclopedia. Available on-line at <http://en.wikipedia.org/wiki/Wikipedia:About>. Last accessed August 20, 2006.

Zakon RH. 2005. Hobbes' Internet Timeline v8.1. Available on-line at <http://www.zakon.org/robert/internet/timeline/>. Last accessed August 18, 2006.

Zhang P. 2000. The effects of animation on information seeking performance on the World Wide Web: Securing attention or interfering with primary tasks? *Journal of the Association for Information Science* 1: 1–28.

AUTHOR'S ADDRESS
Stephen C Burnett
Department of Natural Sciences
Clayton State University
2000 Clayton State Blvd.
Morrow GA 30260
sburnett@clayton.edu

Evolution in the Sunshine State:

THE FIGHT OVER EVOLUTION IN THE STATE SCIENCE EDUCATION STANDARDS

Brandon Haught

It is educational and exciting to witness firsthand the ever-twisting plot that arises in battles over evolution education. I joined with other Florida Citizens for Science (FCS) members and our associates in the Florida capital, Tallahassee, February 19, 2008, when the board of education met to decide the fate of a brand new set of state science education standards (see *RNCSE* 2008 Mar/Apr; 28 [2]: 4–7). There is nothing quite like sitting elbow to elbow in a room packed with your friends, your opponents, and more television cameras than can be found at a Britney Spears court appearance.

This final clash had been a long time coming. The last time the science education standards had been revised was 1996. Evolution education had been hit-or-miss because those standards referred to evolution only as "changes over time". John Winn, Florida's Education Commissioner in 2005, issued a statement explaining the 1996 version's phrasing choice:

> While the standards for science do not specifically mention evolution, the Grades 9-12 standards do include concepts embraced by the theory, such as natural selection and mutation. The actual term "theory of evolution" was not used as it was felt "biological change over time" was both more accurate and acceptable. (Florida Department of Education news release, October 11, 2005 <http://www.fldoe.org/news/2005/2005_10_11.asp>)

That opinion was contested by the Thomas B Fordham Foundation, which in 1998 and then again in 2000 and 2005, blasted Florida's science education with an F each time.

Would Florida rise from the muck in 2008 and shake off the shame of being at the bottom of the class? State government was pushing hard to attract new science-based industry to the southern sunshine — particularly biotech; companies such as Scripps and Burnham set up shop here. So science education would seem essential for an adequate workforce. Spokesman Russell Schweiss explained then-Governor Jeb Bush's position somewhat in 2005: Evolution "is a scientific theory and he's not opposed to it being taught in classrooms," Schweiss said. "But he does not think it should necessarily be dictated in the standards" (*St Petersburg Times* 2005 Dec 25).

Later, fears of a Kansas-style disaster were stoked when Bush filled the position of Florida's K-12 chancellor with Cheri Yecke. Yecke had angered science educators in her previous job as Minnesota education commissioner as that state was revamping its science education standards (see *RNCSE* 2007 Sep–Oct; 27 [5–6]: 20–4). By the time Florida's science education standards review process finally got out of the starting gate, both Bush and Yecke were gone. But apprehension still clouded the air. All but one of the state's seven board of education members were appointed by Bush. Would they hold the same views as their benefactor? An anxious public would have to wait to find out.

THE PROCESS BEGINS

A committee of 31 framers met in May 2007 to begin the process of developing the new standards. The Office of Math and Science (OMS) — a branch of the Florida Department of Education — assembled science educators, business leaders, and private citizens to lay out what should be in the new document. The "framers" heard from nationally recognized experts and examined national and international research. They then created guidelines for the group of 37 "writers" to use in creating the first draft of the new science education standards, which was completed in October 2007. During this process, there were some signs of opposition to evolution's future role in the standards. Fred Cutting, a retired aerospace engineer, was a framing committee member who stated his objections to evolution. He had no significant impact during the writing process, but he would pop up again in later months as the standards moved closer to a final vote by the Board of Education.

The draft was a significant improvement over the 1996 version in many ways. The subject matter was divided up and presented as "big ideas" that could be explored in depth (in contrast to the old standards' method of presenting a wide range of scientific concepts that could only be given superficial treatment in the curriculum). One

Brandon Haught is the communications director for Florida Citizens for Science (<http://www.flascience.org>). His day job is that of a spokesperson for a sheriff's office, but he is also attending college at night with the hope of becoming a science teacher a few years down the road.

highlight was that evolution was among the standards' "big ideas". Various experts, including reviewers who had evaluated Florida's previous standards for the Fordham Foundation, praised the draft as a huge step forward. So far, the science education standards revision process had moved along smoothly.

OMS posted the draft standards on a website and allowed public comment for 60 days. When the comment period ended in mid-December 2007, the website had logged 262 524 responses (compared to about 43 000 for the recently completed math education standards). As a result, public hearings were held in Tallahassee, Orlando, Jacksonville, and Miramar. The first ones were relatively quiet and did not attract too much attention. However, the final meeting in February 2008 attracted more than 70 citizens eager to voice their opinions. Despite the fact the new draft of the science education standards covered every aspect of science education in the public schools, all 70 speakers focused just on evolution. News reports estimated that at least 45 speakers opposed evolution.

The real shocker came when several district school boards tried to influence the standards approval process. The first hint of trouble popped up in Polk County when school board member Kay Fields told her local newspaper that she would consult with her superintendent about what their district could do. "There needs to be intelligent design as well," Fields said. "You need to show both sides" (*Lakeland Ledger* 2007 Nov 13). A follow-up story in the paper polled all of the school board members and found that a majority supported Fields's views (*Lakeland Ledger* 2007 Nov 20). The issue eventually fizzled out there, with no action taken.

Meanwhile, in the northern reaches of the state, other school boards did take action. In January, Taylor County Superintendent Oscar Howard mentioned at one of the standard's public hearings that his and several other counties were sending official resolutions to the state board of education encouraging it either to de-emphasize evolution or allow alternatives to be taught. Howard claimed that hundreds of parents threatened to pull their kids out of public schools if the standards were accepted in their current form. Many of the county school boards tried not to make a public fuss over their resolutions. FCS members uncovered these resolutions only after checking numerous local weekly newspapers and board meeting archives. At least 12 counties — the majority in the northern and panhandle areas of the state — passed similar resolutions with nearly identical wording, as illustrated in this resolution approved 5–0 by the Baker County School Board:

> Now therefore, be it resolved by the Baker County School Board of Baker County, Macclenny, Florida, that the Board urges the State Board of Education to direct the Florida Department of Education to revise the new Sunshine State Standards for Science such that evolution is not presented as fact. (<http://www.flascience.org/BakerResolutionScience.pdf>)

Another phenomenon in north Florida was a small group of women who, despite their playing up a "we're just concerned moms" demeanor, obviously knew how to work the system and were well connected. Kim Kendall, a former air traffic controller from Jacksonville, got quite a bit of coverage in local newspapers. She secured spots at several public hearings and forums; even when she was turned away from a hearing in which the standards were not on the agenda, she parlayed it into news coverage.

Among Kendall's connections were the Florida Family Policy Council and the Florida Baptist State Convention's newspaper, the *Florida Baptist Witness*. The *Witness* gained notoriety in the evolution fight when it broke the news in December 2007 that state board of education member Donna Callaway was opposed to how evolution was presented in the science education standards. Callaway was quoted as saying, "I agree completely that evolution should be taught with all of the research and study that has occurred. However, I believe it should not be taught to the exclusion of other theories of origin of life." The article then wrapped up with Callaway commenting: "My hope is that there will be times of prayer throughout Christian homes and churches directed toward this issue. As a SBOE member, I want those prayers. I want God to be part of this. Is not that ironic?" (*Florida Baptist Witness* 2007 Nov 30).

With one state board member's opinion finally revealed, a few others also let the public know on which side they stood. Linda Taylor went on the record as sympathetic to the inclusion of alternative theories alongside evolution. "I think kids should have the opportunity to compare different theories," she said. Board member Roberto Martinez firmly planted his flag on the pro-evolution side when he said: "I'm a very strong supporter of including evolution. And I think it's long overdue" (*St Petersburg Times* 2007 Dec 6).

That two-to-one vote hung in the air for nearly two months until Akshay Desai evened up the score in early February 2008. He publicly supported evolution, but wound up being the last to do so before the February 19 vote. The three other votes remained shrouded in mystery.

The heat builds

The nationally known religious organization Focus on the Family joined the battle in November 2007, encouraging its sympathizers to push the state board of education to include "intelligent design" in the standards. In response, FCS initiated its "All I Want for Christmas is a Good Science Education" campaign. FCS encouraged citizens to send Christmas cards to the state board of education that included short notes in support of good science — including evolution.

Evolution reared up in regional politics, too. Bill Foster, a former St Petersburg councilman with aspirations to higher office, sent a letter to his local school board warning against the evils of evolution. "Evolution gives our kids an excuse to believe in natural selec-

tion and survival of the fittest, which leads to a belief that they are superior over the weak," he wrote. He also connected evolution to Hitler and the Columbine high school shooting (*St Petersburg Times* 2008 Jan 12).

It seemed that opposition to evolution in the science education standards was overwhelming. But even though the anti-evolution crowd had impressive networking capabilities and could stir up tremendous support from the general public, evolution supporters had resources of their own. Among the organizations that gave support were the National Academy of Sciences, the National Center for Science Education, the American Institute for Biological Sciences, the Florida Academy of Sciences, Americans United for Separation of Church and State, and Florida members of the Clergy Letter Project. Perhaps more important, the writers and framers did not just walk away when the draft was done. They continued to advocate for the draft standards.

As the issue snowballed, FCS members worked tirelessly to stay out in front. Much of the support for the science education standards was only loosely organized. FCS wound up being the focal point of the coordination effort, but through its activities built an amazing foundation. An FCS petition effort gathered more than 1700 signatures both on paper and on the internet, and attracted many present and past Florida university presidents, prominent scientists, and even the director of the National High Magnetic Field Laboratory. The FCS leadership built and maintained networks of evolution supporters, and FCS members wrote letters, made phone calls, and helped spread the word. The commitment to sustain so much volunteer effort for more than a year was awe-inspiring.

The February hearing

Months of suspense finally were coming to an end as the state Board of Education vote neared. But more plot twists were still to come. Fred Cutting, the member of the standards framing committee opposed to evolution, submitted a "minority report" in which he claimed that evolution was being taught "dogmatically"; he recommended several changes, though he had no support from any of the other standards' framers or writers.

Activist Kim Kendall also reappeared with a last-minute surprise. Not satisfied with the 60-day comment period on the internet or the five public hearings held around the state, she dogged the state board of education members relentlessly for a chance to speak directly to them. The board had made it clear that there would be no public input at the February meeting, but the week before it finally bowed to the pressures and agreed to allow 20 people to speak for three minutes each. Half could sign up to speak in favor of the draft standards and the other half in opposition. Those speakers would have to arrive the morning of the meeting and sign up for the slots first come, first served.

Adding to the stress in the final stretch was a surprising 11th-hour proposed change to the standards. Department of Education officials were nervous that the board would never approve the standards against so much opposition to evolution, so they rushed together a compromise the week before the February 19 meeting and officially announced the modified version on the afternoon of Friday, February 15. Hoping to appease the anti-evolutionists, the board inserted the phrase "scientific theory of" into the standards wherever "evolution" appeared and also in any other mention of scientific theories in the standards (see *RNCSE* 2008 Mar/Apr; 28 [2]: 4–7). Thus, when the board met, it had three options: (1) to approve the standards as originally written; (2) not to approve the standards at all; or (3) to approve the last-minute "scientific theory of" compromise.

Before the sun even dawned on February 19, I gathered with fellow supporters of the science education standards at the locked doors of the capitol. When the doors were finally opened and we eagerly dashed inside, we were surprised to see opponents of evolution already waiting in line. Despite our asking them about it, they refused to reveal how they got there before the building was opened. All 120 seats were quickly filled, and plenty of people were left standing. Reporters and television cameras packed the room.

Shortly after 9 AM, board chairman T Willard Fair opened with a short speech, which seemed to be aimed at the anti-science crowd. Sometimes he even spoke directly to Kendall, who was sitting in the front row because she was on the list of speakers. He made it clear that the standards public review process was done openly and fairly with several opportunities for everyone to have input. However, Fair said, as he looked right at Kendall, some people wanted to speak directly to the board. He mentioned that Kendall had spoken to some board members in person over the previous few weeks.

The anti-science speakers tried to pull off a "Hail Mary" play by introducing the "academic freedom" ploy — a gambit new to the Florida evolution debate. They presented a proposal to the board that would permit teachers to cast doubt on evolution under the guises of free speech and critical thinking. A document they handed to the board members contained the following suggested wording:

> Evolution is [a] fundamental concept underlying all of biology and is supported by multiple forms of scientific evidence and teachers should be permitted to engage students in a critical analysis of that evidence. (As reported in a Florida Family Policy Council news release, 2008 Feb 9).

The word "a" in brackets replaces the word "the" in the original, and the "critical analysis" language was new. Having evolution "dogmatically" alone in the standards stifles critical thinking, they said; it has nothing to do with religious beliefs. Mixed in with the academic freedom push were the standard creationist talking points: gaps in the fossil record, discrimination against some scientists who do not "believe in" Darwin, evolution as a theory in crisis; and macroevolution's having never been observed. John Stemberger of the Florida Family

Policy Council said, "Yet we look at the fossil record and we find rats, and bats, but no transitional forms of "rat-bats." Throughout all of their speeches, the main spotlight was on academic freedom, though. Evidence against evolution must be taught!

After a short break, the Office of Math and Science gave a presentation about the standards writing process. Toward the end of that presentation, pro-evolution board member Roberto Martinez seized an opportunity to go on the offensive. He grilled Education Commissioner Eric Smith about the timing and reason for adding "scientific theory of" throughout the document (this version was referred to as Option B). Martinez made it clear that he knew that the changes were made to placate people who oppose evolution in the standards. He asked if the original writers and framers had been consulted. Smith said that an e-mail was sent out to them on Friday afternoon (before the three-day holiday weekend). About 38 of the 68 responded; 29 (76.3%) opposed Option B, two grudgingly accepted Option B if it were the only way to get the standards approved, and 7 (18.4%) approved. Martinez was relentless, going on to question if Option B had been vetted by any scientific organizations in the same way the original draft had. The answer was no. "Then why are we even considering them, commissioner?" Martinez asked.

Callaway interrupted the developing debate, pointing out that no motion had been made by the board yet to approve the standards, so this discussion should not be taking place. After a motion to approve Option B was made and seconded, Martinez once again took the lead. He hammered home his point that efforts to undermine evolution have a long history. "No matter how much the current strategy may have evolved over the last 20 years, the DNA is the same with its common ancestor: creationism," he said.

Finally, Callaway could not take any more. She asserted that despite her strong religious identity that her stance had nothing to do with religion, but was based on her extensive research. She lamented that the presentation of evolution is too dogmatic, denying students their right to explore the issue for themselves. Option B did not address her concerns, but the "Academic Freedom Proposal" given to the board that morning was the perfect solution. Thousands of people do not agree with evolution, and kids need to be made aware of that.

As other board members stated their opinions, the shape of the debate finally took form. Kathleen Shanahan, Raulerson, and Taylor favored Option B. Desai did not like Option B, but was receptive to academic freedom. Fair was the only person to stay completely out of the debate.

Callaway's academic freedom push never gained traction. But the debate did feature her and Martinez coming to verbal blows toward the end. Martinez insisted that Option B's whole intent was to single out evolution. "Scientific theory of evolution as opposed to what other theory?" he asked. "No matter how the issue is cloaked, we know what this is really about." Callaway responded: "I take issue with the fact that you say you know where that's all coming from. I have not heard from a single person who is advocating creationism or intelligent design at all."

Martinez would not be swayed, though, pressing the question of what alternative theory was out there. Callaway answered by trying once again to sell academic freedom. Kids need to explore the issue because there are such great differences of opinion about evolution in the world. "If they come up with another theory, so be it. So be it." She then seized on Martinez's insistence that there were no other theories, trying hang him with his own words, which she seemed to think would show him to be dogmatic and against critical thinking. She failed.

"Respectfully, Donna, it is not a point of debate or controversy in the mainstream scientific community," Martinez said, getting in the final jab of the duel as his supporters in the crowd erupted in loud applause, drowning out whatever Callaway tried to say in response. Fair then stepped in to scold the audience for its outburst.

The final vote

While Martinez and Callaway cooled off, Fair wisely cut short further discussion and called for a vote. Fair, Taylor, Shanahan and Raulerson voted yes to Option B, resulting in the adoption of the "scientific theory of" language. Ironically, Martinez and Desai joined Callaway in opposing the option. Florida now had a new set of science education standards. Martinez and Desai had voted no as a protest against Option B. They both believed that the original version, written and vetted by experts, was better. Option B watered down the standards for no valid scientific or educational reason. FCS and many educators and scientists agreed. But it is worth keeping in mind that the new science education standards are still a huge improvement over the 1996 version. Florida schools and students had won the day.

Callaway voted no because her whole mission had been to get the "Academic Freedom Proposal" on the table. But her efforts floundered. No one can say for sure why; maybe because academic freedom arrived too late on the stage. Perhaps other board members found the proposal distasteful because it was so obviously focused solely on evolution. Whatever the reason, it can be said with a sigh of relief that Florida dodged a bullet. Sound science would be taught in the Sunshine State.

Unfortunately, Tallahassee was right back in the crosshairs a month later. Picking up where Callaway had left off, state lawmakers took up two proposed "academic freedom" bills aimed boldly and squarely at evolution. FCS was forced to get right back to work, and these bills failed to pass in the 2008 session (see <http://www.ncseweb.org/resources/news/2008/FL/739_antievolution_bills_dead_in_fl_5_3_2008.asp> and a report in a future issue of *RNCSE*).

There is no doubt, however, that this saga is to be continued.

Author's address
Brandon Haught
c/o NCSE
PO Box 9477
Berkeley CA 94709-0477
ncseoffice@ncseweb.org

Calvin Meets the Hominins: A Brief History of Creationism in South Africa

LW Retief

The history of South African creationism from the 20th century onward is inextricably intertwined with the political course of the country. The Netherlands established a colony at the southern tip of Africa in 1652. The settlers, spreading northwards, were followed first by French Huguenots and later by the British. The British largely retained their language and customs, unlike the Dutch and French who had been more cut off from their native countries. By the 1930s, this mix produced a uniquely South African language and culture. Armed conflict with the indigenous populations was temporarily resolved and Europeans occupied what is now known as South Africa. The Afrikaans language evolved from Dutch and a great divide (now faded) developed between English- and Afrikaans-speaking South Africans. Most of the latter were farmers or frontiersmen who had little time or inclination for the niceties of philosophical debate, and they were united by a common language and a strict form of Calvinism. The Bible was accepted as literal truth, and black South Africans, illiterate and with customs strange to the European settlers, were regarded as heathen and inferior.

Two independent Dutch-speaking republics (Transvaal and the Orange Free State) were established during the latter half of the 19th century, while the Cape Province and Natal remained British colonies. Parallels were drawn by the citizens of European descent in these republics between themselves and the Jews of antiquity who, against all odds, obtained their independence from an imperial power by struggle, perseverance and belief in God.

It is unlikely that Calvinist doctrine would have allowed evolution to be accepted in those republics but as far I am aware, it was never really a bone of contention at the time. During the Second Anglo-Boer War (1899–1902), Transvaal and the Orange Free State were conquered by Britain, and the whole of South Africa was united as a British colony. The defeat of the two republics had a seminal influence on the subsequent course of South African history.

The inhabitants of the two Boer republics felt, with some justification, that their language, culture and religion — the very fabric of their identity — was under threat. The British High Commissioner for South Africa, Lord Milner, instituted a program of Anglicization that, among other things, enforced the use of English as the sole language of instruction at school.

The predictable result was that Afrikaans-speaking South Africans were drawn closer together, their language, religion, and culture serving as rallying points. The three main Afrikaans churches played a prominent role in fostering Afrikaner identity: the Nederduits Gereformeerde Kerk (Dutch Reformed Church or DRC, the most powerful as far as membership and political influence was concerned), the Gereformeerde Kerke van Suid-Afrika (Reformed Churches of South Africa or RCSA), and the smaller Hervormde Kerk (Reformed Church). The churches soon made their influence felt in almost every sphere of Afrikaner life and together with the Afrikaner Broederbond (Afrikaans Brotherhood, a secret society at its founding) kept a close watch on the school curricula and textbooks, which had to be freed of English "liberal" influence and any reference to evolution (van den Heever 1999).

A sense of exclusivity grew from this religious outlook, and Calvinism was adapted to the "national differences in aptitudes, temperament, national character, history and circumstances" which "[protected] us as a nation during the previous century against Anglicization on the one hand and bastardization on the other" (Erasmus 1946). It was unthinkable that South Africans of European descent could share a common evolutionary ancestry with people of color, because that relationship would have been too close for comfort. It was much easier to accept a divine fiat for the separation of the races as read in the stories of Shem, Ham, and Japheth, and the Tower of Babel.

That is not to say that there was not some disagreement within Calvinist circles. During the late 1920s and early 1930s, Johannes du Plessis, an important figure in the DRC Theological Seminary at the University of Stellenbosch, became a political and theological liberal, stating that the Genesis account should not be taken literally. Du Plessis's highly qualified evolutionary views, however, were cut from cloth weaved by Wallace and not Darwin. For this and other stated opinions he was initially suspended and later discharged from his post. The Western Cape Synod of the DRC had declared evolution a heresy. Du Plessis took the DRC to court and won the case, but in winning the battle he lost the war. He never taught at the seminary again and died an

After obtaining a master's degree in biochemistry, LW Retief studied medicine and now practices in Bellville, near Cape Town. He is an Afrikaans-speaking agnostic happily married to a devoutly Catholic English-speaking South African. Apart from studying creationism and evolution his other hobbies are opera and motor sport.

embittered man in 1935 (Lever 2002; van den Heever 1999).

The effect of the synod's decision was to stifle all discussion of evolution in Afrikaans religious and educational circles for a considerable time. While at least some scientists at universities quietly researched and published on evolution, this work was done mainly (but not exclusively) at English-language institutions.

The more-or-less official viewpoint espoused then and until recently by the three Afrikaans churches will be well known to readers in the USA: the earth is approximately 6000–10 000 years old, everything we know was created by divine fiat in a period of six 24-hour days, and all living forms were created separately with humans as the pinnacle of creation. A world-wide flood devastated the earth some thousands of years ago, and only a few humans, together with representatives of most animals, survived to give rise to the fauna and flora we know today. Species are immutable, and at most one can hope for micro-evolution within "kinds". No proof of evolution exists.

No mention was made of evolution in school textbooks. A well-known theologian wrote: "In Biblical creation the order of the 'genera'… is completely correct. No-one dare … call Genesis a story in this regard any more. Moses was either the most famous gambler in history or an inspired, infallible prophet" (Deist 1994).

The National Party and official anti-evolutionism

In 1948 the National Party came to power. Afrikaners had been gaining political and economic influence during the preceding decades and the NP was the Afrikaner political party par excellence — strongly Calvinist, politically conservative with pronounced authoritarian tendencies. Somewhat more than lip service was paid to the concept of democracy (providing that the voters were "white"), but at least some theologians considered a form of theocracy to be the ideal kind of government (Deist 1994).

The national education policy under the NP became officially "Christian" (that is, Calvinist). Developed some decades before, the curriculum was designed to foster a love for culture, for country, and above all for religion. The concomitant contempt that this policy instilled in some students towards non-European cultures may or may nor have been planned, but the policy resonates with a racialist interpretation of Genesis 9:25–10:32. Furthermore, textbooks paid much attention to South African history, but contained little or no mention of the region's history *before* the arrival of the Dutch settlers. Evolution was not discussed in biology textbooks; it was simply ignored. One rather gets the impression that the authorities hoped that the whole theory would vanish into thin air if it was not mentioned. In 1981 a DRC theologian stated that school and university textbooks were scrutinized to ensure that evolutionary ideas did not slip through the net (van den Heever 1999). Their attempts were not entirely successful. I well remember finding (and devouring) both *On the Origin of Species* and the *Descent of Man* in my town library when in high school.

One may well ask whether any South African creationists were actively involved in any sort of scientific research (in parallel to the Creation Research Society or Institute for Creation Research in the USA). Information on this is extremely meager, but considering that very few creationists elsewhere in the world have carried out any meaningful scientific work this is not surprising. The only name I have been able to find is that of JJ Duyvene de Wit, Professor of Zoology at the University of the Orange Free State during the 1950s and 1960s. He was active in creationist circles, but a cursory search failed to find any reference to published papers of his supporting creationism. An important figure in his circles at the time, he has since fallen into well-deserved obscurity. Most other scientists researching evolution at Afrikaans institutions seemed to have kept their heads below the firing line and merely published their scientific papers without attracting too much public notice. Now and then, a museum exhibit on evolution caused some controversy, but there are no formal studies on the number, scope, and public or official reaction to these exhibits. This state of affairs persisted into the late 1980s.

Transition to democracy

South Africa became involved in a low-intensity war on its borders from the late 1960s onwards. The government's opposition at that time, mostly the African National Congress, was to a large extent backed by communist regimes, which, of course, afforded a perfect opportunity for the then powerful state propaganda apparatus to foster a myth about a so-called "total onslaught" by subversive communist agencies which promoted humanism, equal rights, and, of course, a belief in evolution. As international and local opposition to apartheid mounted, the government of the time desperately attempted to draw all South Africans together into a united front against the common enemy. Evolution, while not a major target of the state propaganda apparatus, was as undesirable as ever. During this period, as more books and television programs on evolution and on science in general reached the public, the unexpected happened, not only on the scientific front but also the political: opposition to the official policies on evolution came not only from outside the borders but also from within Afrikaner ranks.

Against all expectations a peaceful transition of power took place, due, among others, to the then president of South Africa, FW de Klerk. It is perhaps significant that de Klerk is a member of the Reformed Churches of South Africa. This church had slowly been mounting opposition to the apartheid policy since the 1950s when it was, in South African terms, extremely politically incorrect to do so. Their motivation was purely scriptural, in comparison to the more powerful DRC which wholeheartedly supported apartheid (again on scriptural grounds) and which was often called, mockingly, the National Party at prayer.

PRIMER ON CALVINISM

Martin Luther's success opened the way for several movements in the Protestant Reformation of 16th-century Europe. The followers of John Calvin (1509–1564) defined their position within the Reformation as distinct from the Lutheran tradition (and others) in a five-point summary that today goes by the acronym TULIP (see <http://www.reformed.org/calvinism/>). Perhaps the one concept most associated in the public mind with Calvinist theological thinking is the doctrine of predestination. This was a logical outcome of two positions: (1) the generic idea in Reformation traditions that salvation is attained by grace (or faith) only, and not by "works" (that is, nothing that one can *do* will assure salvation simply by virtue of these actions); and (2) the specific (Calvinist) idea that Christ died for the *elect* and not for *all* people. The conclusion drawn from these two positions is that one's future salvation (or damnation) was known by God and predetermined at the beginning of time.

Within ten years, South Africa had undergone a sea change due to pressure from inside the once seemingly unbreachable ranks of the Afrikaners as well as from outside. Evolution will soon be established as part of the school biology curriculum and while many parents still object to this, many or perhaps most members of the younger generation of South Africans simply do not regard this as a problem any more. The DRC, previously a staunch supporter of apartheid, has made a major about-turn and freely admitted its role in past injustices; it now, in general, does not regard evolution as a heresy, although many of its older members still contest this position.

Does this mean that the battle is won? Unfortunately not. The three Afrikaans churches have been losing members at a remarkable rate to the relatively new (in South African terms) charismatic churches, many with American roots. These churches are much more fundamentalist in outlook than the Afrikaans churches ever were. A reason for this may be that fundamentalism offers certainty. The social and political upheavals of the last decade or so has shifted the ground under the feet of the white population; moral, political, and economic certainty are no longer taken for granted and many have turned to churches where a perceived certainty can be obtained.

There is also a deep irony embedded in the stances of the DRC and the RCSA towards evolution. The DRC had supported apartheid and opposed evolution, basing its views on biblical interpretation but has changed their views radically. The Reformed Churches rejected apartheid on scriptural grounds; it has now, for the same reasons, rejected evolution. A recent National Synod of the RCSA decried the teaching of evolution at school and requested Christian teachers not to present evolution as a fact in the classrooms (Anonymous 2003).

The University of Potchefstroom, an institution historically strongly influenced by the RCSA, issues a book on science studies, a mandatory course for students in the natural sciences, pharmacy and engineering (Geertsema and others 1996). One of its authors, WJ Ouweneel, is a member of the Institute for Creation Research. The book, strongly Calvinist in nature, contains very little science as such, nor does it give an overview of science as an intellectual discipline — the few chapters actually dealing with science advocates an old-earth creationist scenario by superficially reviewing what creationists see as major problems with the theory of evolution. PH Stoker, Emeritus Professor of Physics at that university, wrote:

> Because of his sinful nature man exalts the laws, connections and regularities he finds in his science to laws according to which nature operates. In doing this he removes God not only from his science but also from his creation, because the dynamics of nature then progresses according to 'laws' *he* discovered. God is then not necessary for maintenance and guidance.
>
> The implementation of evolution in school curricula means that evolution is read into nature as a law of the biological sciences. Thus God is removed from biological nature, just as He was removed by physical laws from the physical sciences. (Stoker 2001)

Admittedly this is the only university in South Africa where students are taught creationism, and it must be added that this is by no means the viewpoint of many of its staff members. Political power has largely slipped from the hands of the reformed churches, but the banners of creationism are now in the hands of the charismatic churches who, with their growing numbers, may well pose a threat in future.

BIBLIOGRAPHY

[Anonymous]. 2003 Jan 14. Sinode ontevrede oor evolusieleer [Synod unhappy about the theory of evolution]. *Die Volksblad*. Afrikaans.

Deist F. 1994. *Ervaring, Rede en Metode in Skrifuitleg [Experience, Reason and Method in Scriptural Exegesis]*. Pretoria: Council for the Human Sciences. Afrikaans.

Erasmus DF. 1946. Ons eie Calvinisme. *Die Gereformeerde Vaandel [The Reformed Banner]* 14 (11): 11–2. Afrikaans.

Geertsema JC, Reinecke CJ, Ouweneel WJ. 1996. *Wetenskapsleer vir Natuurwetenskappe, Farmasie en Ingenieurswese [Science Studies for Natural Sciences, Pharmacy and Engineering]*. Potchefstroom (South Africa): Potchefstroom University for Christian Higher Education Central Publishing Office. Afrikaans.

Lever J. 2002. *Science, Evolution and Schooling in South Africa. Africa Human Genome Initiative Series.* Cape Town: HSRC Press.

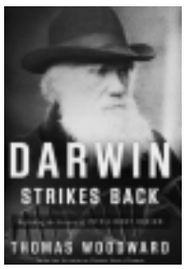
Stoker PH. 2001. Evolusieleer in skole, musea en op radio-en TV-programme [Evolution in schools, museums, and on radio and TV programs]. *Die Kerkpad*. Available on-line at <http://home.mweb.co.za/ke/kerkpad/jan2001/onderwys2.html>. Last accessed August 23, 2008. Afrikaans.

van den Heever J. 1999 Oct 15. Kerk moet duideliker standpunt oor kreasionisme inneem [The church must take a clearer stand on creationism]. *Die Burger*. Afrikaans.

AUTHOR'S ADDRESS

LW Retief
5N Agapanthus Avenue
Welgedacht, Bellville 7530, South Africa
leonr@iafrica.com

BOOK REVIEWS



DARWIN STRIKES BACK: DEFENDING THE SCIENCE OF INTELLIGENT DESIGN

by Thomas Woodward
Grand Rapids (MI): Baker Books, 2006. 224 pages

Reviewed by Jason Rosenhouse

In *Darwin Strikes Back*, Thomas Woodward presents himself as an arbiter between evolution and "intelligent design" (ID). His verdict is that scientists have responded to ID with heat and venom, but have not effectively refuted ID claims.

There are three general types of difficulty with Woodward's book:

- He presents an inaccurate and caricatured version of evolutionists' arguments.
- He does not reference the most scholarly refutations of ID arguments, but focuses instead on short book reviews and popular-level articles.
- When he discusses the scientific details, he routinely gets important things wrong.

Here are some specific examples.

Chapter five discusses Michael Behe's notion of "irreducible complexity." Behe argued that many biological systems were such that if any of their parts were removed the resulting system would cease to function. It followed, Behe claimed, that they could not have evolved gradually by natural selection.

Scientists offered two main replies. First, Behe's logic was simply wrong. That every part is needed in the present does not imply that the system could not have formed gradually. You can see the basic principle in everyday life. Desktop computers are absolutely indispensable today. But in the 1970s and early 80s they were a luxury. Their indispensability evolved gradually over time. Likewise in biology. You could have a part in a system that was not essential when it first appeared, but became essential after further evolutionary changes. This is one of several possibilities.

So the first line of response to Behe was to point out that there are a variety of well-known, observable biological mechanisms through which a supposedly irreducibly complex system could have evolved gradually. Since Behe was the one making grand claims about what was possible and what was not, it was for him to explain why these scenarios, which were drawn from actual scientific research, were impractical.

The second line was to point to specific biochemical systems, some of Behe's favorites among them, and refer to professional research explaining how they evolved. There is a huge literature on blood clotting evolution, or immune system evolution, or eye evolution, to pick a few famous examples. So it is not just that evolution can, in principle, explain complex systems (though that alone would be enough to refute Behe), it is that evolution has done so repeatedly in practice.

Woodward tells a different story. He lists three different approaches he claims scientists have taken towards Behe's argument. First, he claims, they merely attacked Behe's analogy of a mousetrap for illustrating irreducible complexity, rather than the concept itself. It is true that scientists have (rightly) pointed out that Behe's analogy is inapt, but this is hardly the main line of criticism.

Second, Woodward says that scientists have resorted to the "unexplained does not mean unexplainable" defense. Once again, scientists do (rightly) make this point. Certainly there are plenty of complex systems with murky origins. But there are many others that have been so explained, and that is enough to show that there is no fundamental problem here for evolution.

It is only in the third part of his chapter that Woodward moves away from straw men and mentions some of the main arguments raised against Behe. However, he does a thoroughly inept job of it. He gives no clear explanation of the anti-Behe arguments, basing himself almost entirely on popular-level writing. Reading a few book reviews or exchanges on the internet is not adequate.

Woodward also devotes a chapter to Jonathan Wells's book *Icons of Evolution* (Washington [DC]: Regnery, 1999). Wells claimed that many of the standard textbook examples of evolution were false or misleading and chose ten examples to make his case. Scientists responded in the most direct way possible. They showed at length that in every case it was Wells's version of things that was wildly inaccurate and that any charges of fraud were far more plausibly leveled at him than at scientists.

Woodward again ignores the serious, lengthy refutations written by professionals, instead relying almost entirely on short book reviews that appeared in popular-level venues. And when Woodward does discuss actual science, he usually gets it wrong. For example, on pages 103–4 of his book, Woodward discusses the Cambrian explosion. As Woodward tells the story, the critters we find in the Cambrian rocks (among the oldest rocks containing animal fossils) show phylum-level differences. Modern organisms placed in different phyla show profound anatomical differences. Humans, oysters, and spiders are all in different phyla.

In stressing these phylum-level differences, Woodward implies that the animals found in the Cambrian fossils were as wildly different from each other as, say, humans and spiders are today. If this were true, it would be a serious problem for evolutionists.

Sadly, Woodward has simply garbled a fairly basic point of taxonomy. Phyla are classifications used for modern organisms. Applying them

Jason Rosenhouse is Associate Professor of Mathematics at James Madison University. He offers commentary on the endless dispute between evolution and creationism on his blog at <http://www.scienceblogs.com/evolutionblog/>.

retroactively to long-extinct creatures is problematic. When paleontologists place Cambrian fossil X in one phylum and Cambrian fossil Y in a different phylum, they are not saying that X and Y are as different from one another as humans and spiders (for example) are today. They are saying simply that X shows some feature that in modern organisms is associated with one phylum while Y shows some feature that is today associated with a different phylum.

The Cambrian explosion is a problem for evolutionists only in the sense that there are many possible explanations for it, but too little data for coming to a firm conclusion. Woodward shows little awareness of the actual state of scientific play.

This is merely a taste of all that is wrong with this book. Woodward makes much of the fact that scientists use strong rhetoric in denouncing the arguments of ID folks. Of course they do. Woodward and his ilk run around the country accusing scientists of the crassest sort of ignorance and incompetence. The ID literature asserts that the common wisdom in every branch of the life sciences, whether in genetics, evolution, paleontology, anatomy, biochemistry and so on, is simply wrong. People study for years to become experts in any one of these disciplines, and then they have to put up with people bearing obvious religious and political agendas completely distorting everything about their subject. Is it surprising that they respond with anger?

AUTHOR'S ADDRESS
Jason Rosenhouse
Department of Mathematics and Statistics
James Madison University
Harrisonburg VA 22807
rosenhjd@jmu.edu

SECULARISM & SCIENCE IN THE 21ST CENTURY

edited by Ariela Keysar and Barry A Kosmin
Hartford (CT): Institute for the Study of Secularism in Society and Culture, 2008. 213 pages

Reviewed by Lawrence S Lerner

The Institute for the Study of Secularism in Society and Culture (ISSSC) at Hartford's Trinity College engages in a wide spectrum of scholarly activities in the areas implied in its name. Among these activities, a workshop on science education and secular values was held in May 2007. This collection of essays (also available for download free of charge via <http://www.trincoll.edu/secularism institute>) though not a conference proceedings, clearly grew out of that workshop.

The eleven essays in the volume address the warfare against science — and particularly against science education — waged from both the left and the right. I am not sure that this was the main intent of the editors, but the issue emerges clearly. The essays are divided and ordered — rather arbitrarily, I think — into three related areas: the evolution–creation conflict, teaching science, and scientific literacy and public policy.

Jon Miller and Robert Pennock set the stage in the first essay. They present a summary of surveys, mostly by Miller and his associates, of public attitudes toward science, technology, and religion, with special emphasis on evolution. There is nothing surprising here: Americans think well of science, and see at least potential conflict between science and faith. They accept or reject evolution about half and half, with more rejecters than in any other country except Turkey. This the authors attribute to minimal knowledge of both the facts and the methods of the sciences — a view that is far from new. In their conclusion, they argue "[The public] need to know how the different sciences are interconnected in such a way that one may not simply choose to disbelieve some particular scientific conclusion in isolation" (p 30). Few will disagree.

The second essay, Daniel Blackburn's "The creationist attack on science and secular society," gives a very brief history of creationism since the 1925 Scopes trial. Most significantly, Blackburn notes that creationism is not an isolated movement. Rather, it "can be seen as the vanguard of a theocratic movement, and its attack on public school curricula part of an explicit assault on secular society, free inquiry, and academic freedom … the most public manifestation of a broad-based and well-financed effort to replace secular society with a theocratic state" (p 44).

The first essay in Part II is William Cobern's "The competing influence of secularism and religion on science education in a secular society." It amounts to an exposition of a Religious Right position on education, thinly veiled as middle-of-the-road for its perceived audience. Predictably, Cobern begins with an account of the decay of traditional morality: "There were the Kinsey Institute reports, … *Playboy* appeared on the newsstands everywhere, … sex education in the public schools became a foregone conclusion. … *Engel v Vitale* (1962) and *Abington v Schempp* (1963) ended legal sponsorship of prayer and Bible devotionals. And court-ordered busing for school desegregation in the late 1960s severely weakened the local control of schools" (p 91–2).

Cobern reserves his real venom for Richard Dawkins and the authors of similar best-sellers, such as Daniel Dennett and Sam Harris. They are "in the throes of apoplexy" because atheism has not swept the country, and their books are "hysterical pleadings." Cobern's dilemma lies in his departure from most of his coreligionists in his adherence to real science and to evolution in particular. By linking evolution to atheism, he argues, Dawkins and others dispose the broad middle of religious Americans to creationism.

Using a term mined from the works of Paul Tillich, Cobern redefines religion, generalizing it to mean "ultimate concern." It follows that *everyone* — Dawkins included — is religious. Having thus defined religion into meaninglessness, Cobern argues that Christians can find a congenial meeting ground with others in what he calls methodological secularism. This he distinguishes from philosophical secularism, which, I suppose, is the fractious stance of Dawkins.

From all this, Cobern extracts four rules for teaching science: Teach science, not scientism; teach for sound understanding, not belief; teach the evidence; and give students time to explore their own ideas. None of these ideas is novel or controversial, and none really requires Cobern's peevish preliminaries for its genesis.

David Henderson's essay, "Implementing methodological secularism," merely expands on Cobern's, and needs no discussion here.

Lawrence S Lerner is Professor Emeritus in the College of Natural Sciences and Mathematics at California State University, Long Beach, and a nationally recognized expert on state science standards. He received NCSE's Friend of Darwin award in 2003.

Philosopher Austin Dacey proposes a counterargument to Cobern's and Henderson's jeremiads. He argues, in oddly tentative terms, that Dawkins and others may actually soften the science–religion conflict by defining an opposite extreme to creationism. Given these extremes, the middle, where science and religion are in harmony, may be seen as such by the general public. This he calls the Dawkins Effect.

Biochemist Juan Antonio Aguilera Mochón presents a Spanish perspective in his essay. In Spanish schools, "religion is taught alongside science as part of the general curriculum" (p 137). Religion teaches the possibility of miracles — supernatural interventions in the natural world. As Victor Stenger did in his *God: The Failed Hypothesis* (Amherst [NY]: Prometheus, 2007), Aguilera argues that this leads to inevitable conflict. "Religious instructors … very rarely admit that evolution was and is a purely natural process. … Therefore, most Spanish children learn in school to make the two subjects and approaches compatible through a variety of ways of 'double thinking.' … this confusing situation is not unique to Spain" (p 147). Aguilera concludes, "[A]n indoctrination that is based on faith and belief and miracles is incompatible with a scientific education that is based on evidence and critical thinking" (p 147).

In Part III, agricultural ethicist Jeffrey Burkhardt takes a postmodernist, "left-wing" position. With an ill-concealed antipathy for what he calls the "Science Establishment," Burkhardt makes a series of questionable arguments. One is that the apparent unity of the sciences and their methodologies is illusory; that "what science really is is a collection of disparate epistemic and moral cultures …" (p 164). Next, he argues that scientific literacy is a chimera. And in the spirit of true postmodern relativism he concludes that "A modernist believer in Truth and The Good must respect the right of others to believe in Creationism, astrology, Scientology, and the like, even if these are all — scientifically speaking — wrong" (p 169).

In their essay, Barry Kosmin and Juhem Navarro-Rivera argue quite the opposite: "[C]ontrary to Burkhardt's opinion, the goal of science education is … to have a rational public that understands, at a basic level, the costs and benefits of implementing such policies" (p 181). The antiscientific stances of both the postmodern left and the religious right are neatly summarized thus:

> [The concept of] science as a common good embodying value-neutral knowledge has come to be disputed by certain communities that feel threatened by the implications of scientific research for their own worldviews. In the academy, a fashionable relativist and postcolonial outlook belittles the achievements of science and instead values 'local knowledge' grounded in indigenous or ancient conceptual categories. More importantly, science had come under challenge from a resurgent religious fundamentalism, which above all seeks to protect young people from being taught scientific ideas that seem to threaten religious beliefs. (p 176)

Taken as a whole, this book does not appear to break any new ground. It does present arguments for and against teaching science unfettered by ideology and does so at one remove from the specifics of arguments over creationism, stem-cell research, global warming, and so on. But although I surely wish ISSSC success in its endeavors, I don't see much to attract the non-specialist reader.

Author's address
Lawrence S Lerner
College of Natural Science & Mathematics
California State University, Long Beach
1250 Bellflower Boulevard
Long Beach CA 90840
lslerner@csulb.edu

Beyond the Firmament: Understanding Science and the Theology of Creation

by Gordon J Glover
Chesapeake (VA): Watertree Press, 2007. 228 pages

Reviewed by
Stephen Matheson

We all know the story already. Evangelical Protestant Christians, by sizable majorities, reject biological evolution and embrace a view that is crudely described as "creationism." Whole ministries and "institutes" work tirelessly to discredit evolutionary science, churning out propaganda that ranges from the sublimely mistaken to the ridiculously dishonest. Evangelicals are repeatedly offered the choice between evolution and creation, beset by creationist apologetics on one hand and atheistic triumphalism on the other, both well-girded for culture war. When the characters move out of range of parody, it is almost funny, but war is hell, and this is war.

Now suppose you are a reader of *RNCSE*, and you want to be a hero, to rescue an evangelical friend from this grim battlefield and its damaging crossfire. What now? There is the science education approach: help your friend understand basic geology and evolutionary biology, so that he or she can get past the nonsense dispensed by the folk science networks. That is important work, and your rescue attempt might fail without it. But it is likely that a given evangelical's biggest hurdle is not ignorance of genetics and biogeography, or even enthusiasm for incredulity-based design arguments, but the sense that evolutionary accounts of natural history are theological poison. The barrier is the Bible, specifically the creation accounts in Genesis, and standard evangelical approaches to understanding them.

Many would have you believe that this task is impossible, that in fact the evangelical understanding of Genesis is clearly at odds with an ancient biosphere characterized by common ancestry and that your evangelical friend must either continue to take fire from scientific naturalism or repent of his evangelical ways and embrace a view of Genesis that is "figurative" or "non-literal" or something like that. Gordon J Glover, in his superb book *Beyond the Firmament*, would beg to differ.

And who is this Gordon Glover? Well, he is not a creationist (though he used to be), he is not an academic scholar, and he is not a wuss. He is a former Navy deep-sea diver and engineer, and he is a hard-nosed evangelical Christian. (He even looks like an evangelical.) He reads a lot and thinks a lot, but he is not a pointy-headed academic, and that (along with a keen wit and a generous sense of humor) is one of his clearest assets. Because in all likelihood, your struggling evangelical friend needs fellow evangelicals,

Stephen Matheson is Associate Professor of Biology at Calvin College (and Steve #763 in NCSE's Project Steve). He blogs on issues of science and Christian faith at <http://sfmatheson.blogspot.com/>.

whom he can trust, to help him get out of the crossfire — the theologians and the scientists might have to come later. *Beyond the Firmament* represents an opportunity for your friend to sit down with someone who gets it, who knows what is at stake and why everyone is so worried, and who sees the way forward.

So is this one of those lame attempts at concordism, where the author pounds the square pegs of Genesis into the round holes of natural history? Hardly; indeed, Glover is deliciously scornful of such exercises, in sections of the book that should make most readers laugh out loud. (On the claims of one prominent Christian apologist regarding biblical support for an expanding universe: "I'm sure this news comes as a big relief to those whose faith was hanging on whether or not the cosmic expansion taught by the Bible was in agreement with the latest CMBR data from the Wilkinson Microwave Anisotropy Probe" [p 136].) No, Glover's project is more ambitious than that.

The heart of Glover's book, it seems to me, is chapter 3, "The context of creation." Glover summarizes the ancient Near Eastern origin of the Genesis creation accounts, demonstrating that the narratives are, cosmologically speaking, adopted completely from the creation myths of the time. The differences are profound, but they are entirely theological. Cosmologically, according to Glover, Genesis clearly indicates that the earth is "a great big table sitting over a watery abyss and lying under a solid firmament" (p 63). He explains that this cosmology was nothing special in its time. That firmament, which was always understood to be a solid dome of some kind, akin to a giant planetarium, is what he calls "the smoking gun," the clear link between the biblical creation account and its pagan counterparts. Reflecting on this relationship, Glover makes this observation:

> Rather than seize the opportunity to overturn the commonly held view of the universe which was riddled with theological and cosmological error, God seems to hijack the popular cosmogony and use it as a vehicle to set the *theological* record straight, leaving the *cosmological* record intact. (p 63)

The move that Glover makes in this section is one that I and many other evangelicals believe to be central to any honest approach to Genesis. While affirming the Bible to be infallible, and even inerrant, he is flatly stating that the cosmology of Genesis is wrong. Not just "figurative," but *wrong*. (Glover then concludes that the cosmological narrative, because it is plainly inaccurate, cannot be intended to provide an accurate description of the physical universe.) This is a serious step for any evangelical, and Glover's handling of the section is masterful. It could get your friend out of harm's way.

With similar clarity and wry humor, he covers basic scientific principles (emphasizing uniformity), and nicely discusses areas of modern science (the age of the cosmos and the earth, and common descent) of concern to evangelicals. His comments on miracles, intervention, and the sovereignty of God should be helpful to many confused Christians. The book is full of brilliant metaphors and timely jokes, and it's fun to read.

Beyond the Firmament is clearly written for evangelical Christians, and many of its rough spots arise from this somewhat narrow focus. Science is repeatedly referred to as a "mission field," and many of Glover's complaints about "creation science" deal with the barriers it erects between scientists and (evangelical) Christian faith. Some of the best jokes (if you raise questions about the "waters above the sky-dome" you're likely to "end up at the top of somebody's prayer list" [p 63]) are aimed specifically at evangelicals. Many themes that some readers will find obvious or simplistic are revisited a little too often. Glover's jaunty, conversational style will help many readers, but the footnotes are barely adequate and there is no index. A section on materialism and morality struck me as simplistic and unnecessary.

But many of these weaknesses are indications that the book is a perfect tool for its intended purpose: a serious examination of creation and science, for serious evangelical laypersons who sense that Christian folk science is (and has ever been) a failure. It might just save your friend's faith, and win a friend for science in the process.

Author's address
Stephen Matheson
Biology Department
Calvin College
1726 Knollcrest Circle SE
Grand Rapids MI 49546-4403
smatheso@calvin.edu

Intelligent Design Versus Evolution

edited by Louise Gerdes
Detroit: Greenhaven Press, 2008.
126 pages

Reviewed by
Michael K O'Sullivan

The *At Issue* series from Greenhaven Press has become a standard in many public high school libraries, due primarily to the pro/con, point/counterpoint, balanced approach it takes with any controversial issue or topic. The introduction of each volume is used to give readers a historical and current perspective on the issue, and an overview essay from a previously published source is used to present the controversies surrounding the issue.

The introduction to this volume attempts to cover the history of this controversial topic from Charles Darwin's publication of his evolutionary theory in 1859 to the Scopes "monkey" trial in 1925 and up to the machinations taken by the Kansas state board of education in 2005 when it redefined science and opened the door to supernatural explanations in its classrooms, and its reversal in 2007, when it returned to the more mainstream scientific definition of evolution. Missing from this introduction and the overview essay, however, is the *Kitzmiller v Dover Area School District* decision from 2005, in which a federal district judge ruled that this Pennsylvania school district violated the Constitution by requiring the presentation of "intelligent design" in its science curriculum. This court decision does appear later in the book, but does not receive adequate or fair coverage.

The essays compiled by the editor for this publication are reprinted

---

Michael K O'Sullivan is the Instructional Media Coordinator at Rosemount Senior High School in Rosemount, Minnesota. He is co-author, with his wife Connie O'Sullivan, of "Monkey business: The intelligent design war has come to the school library" (School Library Journal 2005 *Nov; 51 [11]: 42–5) and "Selection or censorship: Libraries and the intelligent design debate"* (Library Review *2007 Mar; 56 [3]: 200–7).*

with permission from a variety of publications, including newspapers, magazines, professional journals, and books. It should also be noted that these essays have been edited to meet certain publication requirements. Prominent and not so prominent spokespersons from both sides of the issue are featured in this volume. If you have followed this battle for any length of time, you will recognize several of the names of the commentators with essays included in this edition. Two of the more outspoken commentators included in this volume are William Dembski and Richard Dawkins.

Following the point/counterpoint style of the *At Issue* series, the book presents a piece arguing that "intelligent design" is based on science, not religion, and then a piece countering that "intelligent design" is religion, not science. A third perspective also is offered: "intelligent design" is neither religion nor science. This particular essay, written by John Derbyshire, a journalist and author who writes for conservative political newsmagazines, originally appeared in the conservative magazine *National Review*. Evolution is then addressed by Dawkins in his essay entitled, "Evolution is an accepted fact," and is countered by Dembski's attempt to compare evolution to alchemy.

Considering this volume is primarily targeting high school students, the biggest problem with Dembski's article "Evolution is a flawed theory", which is reproduced in its entirety, will be the difficulty high school students will have in following and comprehending Dembski's meandering discussion of how evolution resembles alchemy more than science. For example, I wonder how many students would comprehend his conclusion, "The lesson of alchemy should be plain: Causal specificity cannot be redeemed in the coin of metaphysics, be it Neoplatonic or materialistic" (p 56). The selection of this essay to counter Dawkins's argument was a poor editorial choice. I am sure that there are plenty of other pieces the editor could have selected that would have been more age-appropriate and readable for high school students.

The tactic of incorporating "intelligent design" in the science curriculum by "teaching the controversy" also is addressed. Jonathan Witt, a fellow at the Discovery Institute, takes the point of view that "Critical analysis of evolutionary theory should be taught in the public schools." Alan Leshner, chief executive officer of the American Association for the Advancement of Science, counters with the obvious point that the science classroom should be used for the teaching of science. Leshner summarizes, "At a time when the United States faces increasing global competition in science and technology, public school science classrooms should remain free of ideological interference and dedicated to the rigor that has made American science the envy of the world" (p 66).

This volume provides a further legitimate rebuttal to the "teach the controversy" argument, with an essay entitled "Intelligent design should be taught in religion classes, not science." It is in such classes, according to Michael Ruse, professor of philosophy at Florida State University, that beliefs such as "intelligent design" can be debated along with other "faith-based" beliefs.

As previously mentioned, one area where this book significantly fails is in its coverage of the *Kitzmiller v Dover Area School District* decision. The book does not fairly or adequately cover this major judicial decision. The only article that addresses this case, "Outlawing discussion of intelligent design in schools is a violation," is written by John Calvert, an attorney who serves as managing director of the Intelligent Design Network, and counsels school boards, school administrators, and science teachers regarding the teaching of what he calls origins science.

Calvert misrepresents the judge's findings in the Dover decision, calling it "twisted", and claiming it effectively establishes a state sponsored ideology. He even claims that the court "inserted a religious bias into science, while purporting to remove one" (p 73). Unfortunately this book does not provide a counterargument to Calvert's interpretation, so the average student, with a limited or no awareness of this judicial decision, will be left with a highly skewed interpretation of what even the media described at the time as a very thorough and comprehensive ruling. Unless a science teacher or a high school librarian selecting this book has stayed current on the issue of "intelligent design", this shortcoming in the book will be easily overlooked.

This book, as part of the *At Issue* series, does a fairly thorough job of presenting both sides of the various arguments surrounding the "intelligent design" versus evolution battle. However, the content of several of the articles, as previously mentioned, will require some introductory knowledge and understanding of evolution.

One would hope that books like the *At Issue* series will encourage critical thinking and analysis among high school students, as they are designed to do. However, it has been my experience as a high school librarian that many students approach controversial topics with a preconceived opinion. Students picking up this book, or even going into the publisher's on-line version (Opposing Viewpoints), will migrate to the point of view that supports their belief, while ignoring the opposing viewpoint. This is not the fault of the publisher or the editor in their choice of articles, unless they neglect to include articles from a certain perspective. Encouraging students to review and analyze viewpoints critically is the role of the teacher or the media specialist. As teachers, we need to encourage students to approach controversial issues with an open mind and to be receptive to different points of view. Students looking for arguments to support a particular point of view in the "intelligent design" versus evolution debate will not be disappointed in this volume.

AUTHOR'S ADDRESS
Michael K O'Sullivan
Rosemount High School
3335 142nd Street West
Rosemount MN 55068
michael.osullivan@district196.org

NATIONAL CENTER FOR SCIENCE EDUCATION
PO Box 9477
Berkeley CA 94709-0477

Change Service Requested

Non-Profit Org.
U.S. Postage
PAID
Permit 1197
Berkeley CA

28(4)

Membership in the National Center for Science Education brings you

- One year's subscription to *Reports of the National Center for Science Education* (6 issues)
- Participation in NCSE's diverse efforts to promote and defend the integrity of science education

MEMBERSHIP / SUBSCRIPTION / DONATION

Name

Address City State Zip

Home Phone Work Phone

Occupation

☐ Check here if NCSE may share your name with activists in your state
☐ Check here if you object to our sharing your name with other nonprofit organizations

NCSE MEMBERSHIP **ONE YEAR** US: $30 Foreign Air: $39 **LIFETIME** $600	$
TAX DEDUCTIBLE CONTRIBUTION TO NCSE	$
BACK ISSUES *NCSE Reports / C/E Newsletter* (Vol 1–16, $3 per issue; $18 per volume; all 16 vols, $150) *C/E Journal* (1–9 copies, $6 each; 10 or more, $5 each; full set, nrs 1–39, $150) *RNCSE* (Vol 17–28, $5 per issue; $24 per volume)	$
SHIPPING $1.25 for 1 issue, add $1 for each additional issue; maximum of $10	$
TOTAL ☐ Check (US dollars) Charge to: ☐ VISA ☐ MasterCard ☐ AmEx	$

Credit Card Number Expiration Date

Name as it appears on card

Signature

SUBSCRIBER INFORMATION
Subscriptions are fully tax deductible. NCSE is tax exempt under Federal IRS Code 501(c)(3) and the corresponding provisions of the California law. Amounts paid to NCSE are tax-deductible to the extent permitted by law.

Printed on recycled paper.

MISSING ISSUES
If your issue fails to arrive or is badly damaged in transit, send us the date of issue and we will rush you a replacement.

Please mail all correspondence about your subscription to NCSE, PO Box 9477, Berkeley, CA 94709-0477 or call (510) 601-7203 or (800) 290-6006 or e-mail us at NCSE@ncseweb.org

MOVING TO A NEW ADDRESS?
Let us know your new address as early as possible and we will update our records of your subscription accordingly. Please allow 4 weeks for an address change.