

REPORTS

OF THE
NATIONAL CENTER FOR SCIENCE EDUCATION
DEFENDING THE TEACHING OF EVOLUTION IN THE PUBLIC SCHOOLS



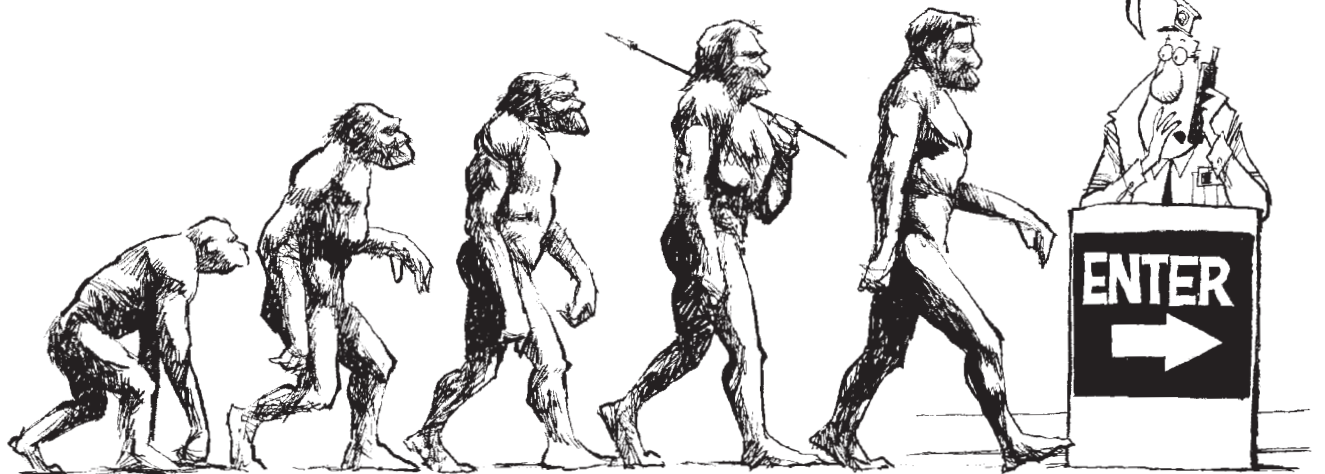
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CREATION MUSEUM



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Answers in Genesis
Opens Creation
Museum

Tenth Anniversary Issue
What's New;
What's Not

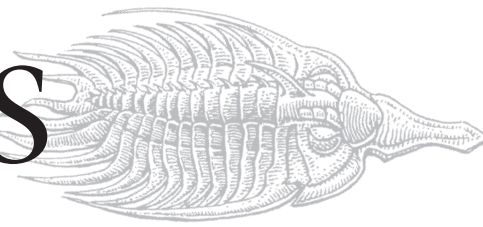
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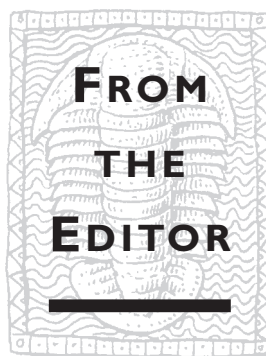
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This issue of *RNCSE* marks the tenth anniversary of the first publication since *NCSE Reports* and *Creation/Evolution* were merged. In this issue there are two articles that explore how NCSE and our publications have changed over that period of time. *RNCSE* has succeeded in

bringing more variety and greater depth than we were able to in the previous formats. Our analysis of the journal's content over the past ten years shows that we continued our coverage and analysis of anti-evolutionism and of legal, political, and media presentations of these arguments. However, the new format allowed us to bring to our readers additional analysis and perspective.

The NCSE staff and budget have grown, too. Executive Director Eugenie C Scott shows how the addition of more staff with diverse backgrounds has helped NCSE to promote evolution and to provide more advice and resources for grassroots organizations supporting evolution. Despite the new faces and labels on the creationist scene, NCSE faces a recycling of the same objections and criticisms of evolution, on multiple fronts.

As we reported in our last issue, Answers in Genesis finally opened its "Creation Museum" in northern Kentucky. AiG's attempts to open this museum were, ironically, the topic of one of the first stories that I edited for the old *NCSE Reports* in 1996, when zoning regulations were preventing the construction. Now Tim Heaton reports that the museum is a real adventure! However, it appears that AiG has as much of a problem with other creationist views as it does with naturalistic evolution. (See also Daniel Phelps's entertaining account of his visit on-line at <http://www.ncseweb.org/resources/articles/1411_the_antimuseum_an_overview_a_7_6_200.asp>.)

In the news, we see flare-ups in several states. Nationwide, the only candidate for president of a national association of school boards is a supporter of "intelligent design". We also report on the deaths of four people who were important to NCSE's mission. Jerry Falwell and Norma Gabler were formidable opponents of evolution education and shaped the creationism/evolution conflict for many years. Stanley Miller and F Clark Howell were groundbreaking researchers in origin-of-life and human evolution research, respectively. Howell was also a supporter, mentor, and friend to NCSE for many years, and he will be missed.

The news from the membership is, once again, the longest item in the issue. It just goes to show how active (and effective) our membership is in getting out the word and promoting evolution whenever it is threatened. If you do not see yourself there, please be sure to drop a note to Glenn Branch to let him know what you are doing locally (or e-mail him at branch@ncseweb.org).

BOOKS TO CONSIDER

Our previous issue was a book review issue, but we had so many reviews submitted over the past few months that we expanded this issue into a double issue to accommodate most of those that have been awaiting publication. Featured here are reviews of books that explore some aspect of the dialog between science and religion. Some engage it directly and in a positive way. Others try to make a case for the fundamental incompatibility of the two.

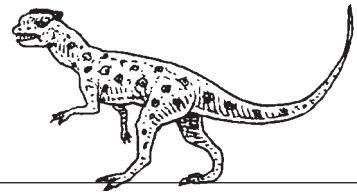
Two books offer different Jewish reactions to the science of evolution. Natan Slifkin's *The Challenge of Creation* argues for the compatibility with Orthodox Judaism, which Shai Cherry finds praiseworthy even while expressing discomfort with the details; Lee Spetner's *Not By Chance!* attacks evolution on statistical grounds but is motivated, as Zev Stern explains, by a form of literalism about the Torah. Meanwhile, *Jewish Tradition and the Challenge of Darwinism* surveys a range of historical responses to evolution from the Jewish community.

Books from a Christian perspective are also discussed. Clay Farris Naff writes that Michael Dowd's *Thank God for Evolution!* tries mightily for a synthesis, but cannot seem to get the vision of faith and the vision of science to converge. Phina Borgeson writes that Denyse O'Leary's *By Design or By Chance?* fails on both scientific and theological grounds. *The Evolution Dialogues* and Joan Roughgarden's *Evolution and Christian Faith* do better because they are committed to treating the scientific issues with integrity while grappling with the religious issues they raise.

We also have reviews of several other books that take science and religion seriously. McCalla's *The Creationist Debate*, Kitcher's *Living with Darwin*, and Ruse's *Darwinism and its Discontents* all receive praise for their scholarship and perspective.

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UPDATES



California, Ventura County: A seventh-grade science textbook was adopted by the Ventura County Board of Education despite the qualms of anti-evolutionist members of the board. According to the *Simi Valley Acorn* (2007 Jul 6), Ron Matthews (a long-time opponent of evolution education on the board; see *RNCSE* 2004 Sep/Oct; 24 [5]: 12-5) was the sole holdout on the July 5, 2007, 3-1 vote to adopt Pearson Prentice Hall's *Focus on California Life Science*. In February 2007, a motion to approve the text was tabled, following accusations from a local parent, Carl Olson, that the book was inaccurate. At the July meeting, Olson and others continued to complain about the book — one person testified, "I've studied every scientific journal and there's no proof of evolution anywhere" — and to call for the inclusion of "the other side"; a video presentation from the Discovery Institute was reportedly shown at the meeting. Although the book was adopted, there are signs that anti-evolutionists on the board still hope to undermine evolution education; several motions aimed at "expanding the science curriculum" were reportedly broached at the meeting, although it is unclear whether any remain on the agenda.

Florida, Pensacola: On November 2, 2006, the flamboyant young-earth creationist Kent Hovind was found guilty of 58 charges in a federal court (see *RNCSE* 2006 Jul/Aug; 26 [4]: 12-3), remaining in custody until his sentencing on January 19, 2007. At the sentencing, the *Pensacola News-Journal* (2007 Jan 20) reported, Hovind adopted a meek demeanor, telling the judge, "I stand here in great fear of the power of this court. Your decision can destroy my life, my ministry and my grandchildren." But recordings of his telephone conversations from the jail, played in court, told a different story: Hovind accused the Internal Revenue Service, the judge, and the prosecutor of violating the law in prosecuting him, and referred to

unspecified things he could do "to make their lives miserable." In handing down the sentence, the judge explained that Hovind's troubles were due to his "refusing to accept what the law is." In addition to ten years in prison and three years of probation, Hovind's sentence also included paying over \$600 000 in restitution to the IRS.

In "Earth to 'Dr Dino': Please pay your taxes and start facing reality," a columnist for the *News-Journal* (2007 Jan 21) was unsympathetic to Hovind's plight, writing, "You got caught, so quit whining and take your punishment like a man." The columnist continued, "Hovind is sniffing in court, dabbing tears from his eyes and comparing himself to Jesus and Job. He urges the judge to let him go home rather than do serious time for bilking the government. This same government guarantees 'Dr Dino' freedom of religion and freedom of speech so he can denounce the theory of evolution, promote "creation science" — an oxymoron to many — and operate Dinosaur Adventure Land and Creation Science Evangelism." The columnist was more sympathetic to Jo Hovind, who was found guilty of 44 charges; she was eventually sentenced to serve a year and a day in prison and ordered to pay \$8000 in fines and costs (*Pensacola News-Journal* 2007 Jul 1).

Meanwhile, Hovind's appeal to the US Court of Appeals for the 11th Circuit, claiming that he was prevented from challenging the amount of his tax liability, was denied; the *Pensacola News-Journal* (2007 Jul 4) reported, "A three-judge panel ruled that Hovind failed to raise the issue at the right time, so he waived his rights to contest his tax liability." According to a June 12, 2007, post at the Creation Science Evangelism blog (<<http://www.cseblogs.com>>), Hovind is currently incarcerated at Federal Correctional Institution in Edgefield, South Carolina, a medium security facility.

Nebraska, McCook: Jim Garretson, a science instructor at

McCook Community College, planned to teach a "special topics" class on creation science in the physics department in the fall of 2007, telling the *Southwest Nebraska News* (2007 Mar 30) that "I'm not going to attack Evolutionists and I'm not going to try and convert people to the Creationist view, I just want [to] offer a different viewpoint ... Presenting opposing viewpoints is just part of being an educator." Local scientists, including NCSE member Les Lane of the University of Nebraska at Lincoln and Robert I Price of the University of Nebraska at Kearney, protested, with Price telling the college, "Garretson's proposal exhibits a profound lack of an understanding of science and/or an exceptional academic dishonesty on his part" (*McCook County Gazette* 2007 Apr 7). NCSE learned that the college subsequently decided to relabel the class as a philosophy class, a decision that the executive director of the American Philosophical Association protested in a letter to the college's president. Finally, on May 10, 2007, the college decided to cancel the class altogether.

Ohio: Tom Sawyer, the former mayor of Akron and former congressional representative who defeated incumbent Deborah Owens-Fink for the District 7 seat on the Ohio state board of education in the November 2006 election (see *RNCSE* 2006 Sep/Oct; 26 [5]: 4-10), was appointed to the Ohio Senate in February 2007, which required him to leave his newly won seat on the board. Support for evolution education was a mainstay of Sawyer's campaign against Owens-Fink, who consistently backed anti-evolution measures, including the "Critical Analysis of Evolution" model lesson plan, which was rescinded by the board in February 2006 (see *RNCSE* 2006 May/Jun; 26 [3]: 7-11). Governor Ted Strickland appointed Heather Licata to replace Sawyer, according to the *Akron Beacon-Journal* (2007 Mar 3); there were no reports in the



press explicitly discussing Licata's views on evolution education.

Texas: In February 2007, Warren Chisum (R-District 88) — the second most powerful legislator in the Texas House of Representatives — circulated a memorandum to his colleagues, which (as *The New York Times* reported, 2007 Feb 17):

... declared that "tax-supported evolution science" was based on religion and therefore unlawful under the United States Constitution.

It continued, "Indisputable evidence — long hidden but now available to everyone — demonstrates conclusively that so-called secular evolution science is the Big Bang 15-billion-year alternate 'creation scenario' of the Pharisee Religion."

"This scenario," the memorandum stated, "is derived concept-for-concept from Rabbinic writings on the mystic 'holy book' kabbala dating back at least two millennia."

Chisum obtained the memorandum from Ben Bridges (R-District 7), a state legislator in Georgia who persistently introduces anti-evolution legislation there, most recently House Bill 179 in 2005 (see *RNCSE* 2004 Nov/Dec; 24 [6]: 15–20). But Bridges was not its author. Instead, he was merely relaying the memorandum from his constituent Marshall Hall, president of the Fair Education Foundation (<<http://www.fixedearth.com/>>, who rejects not only evolution but also heliocentrism. On his website, Hall decries "the counterfeit Copernican Model of a rotating and orbiting Earth," which he blames not only for "the incredible evolution myth" but also for "the global warming obsession."

Reaction to the memorandum was swift and negative. In a February 14, 2007, letter to Chisum, the director of the North Texas-Oklahoma regional office of the Anti-Defamation League wrote, "We are shocked and appalled that you would share this outrageous anti-Semitic material with your colleagues in the Texas House"; Chisum distanced himself from the memorandum in response, writ-

ing, "I sincerely regret that I did not take the time to carefully review these materials and recognize that I may have hurt or offended some groups including some of my dear friends." In Georgia, the ADL's southeast regional director called on Bridges to apologize; Bridges told the *Atlanta Journal-Constitution* (2007 Feb 16) that he had nothing to do with the memorandum, but Hall disagreed, saying, "I gave him a copy of it months ago ... I had already written this up as an idea to present to him so he could see what it was and what we were thinking." According to the newspaper, "Bridges said the views in the memo belong to Hall, though Bridges said he doesn't necessarily disagree with them." NCSE's deputy director Glenn Branch described the memorandum as "bizarre," adding that evolution "is recognized as a central unifying principle of the biological sciences by the scientific community and the education community." Criticism of the memorandum came also from a rather unexpected source: Gerardus Bouw, a geocentrist associated with the Association for Biblical Astronomy (<<http://www.geocentricity.com/>>), groaned when Hall's name was mentioned, according to a column in the *Fort Worth Star-Telegram* (2007 Feb 20).

Virginia, Chesterfield: As the Chesterfield School Board was adopting new science textbooks for middle schools and high schools, it was lobbied to include "intelligent design" in the curriculum, reports the *Chesterfield Observer* (2007 Jun 5). "In the end, members unanimously approved the proposed textbooks, but issued a formal statement saying, 'It is the School Board's belief that this topic [the theory of evolution], along with all other topics that raise differences of thought and opinion, should receive the thorough and unrestricted study as we have just articulated. Accordingly, we direct our superintendent to charge those of our professionals who support curriculum development and implementation with the responsibility to investigate and develop processes that encompass a comprehensive approach to the teaching and learning of these topics.' It is unclear whether or not

the statement is intended to provide cover for the eventual adoption of supplementary materials, such as textbooks (*Of Pandas and People*; *Explore Evolution*) or audiovisual materials (*Icons of Evolution*; *Unlocking the Mystery of Life*), favored by creationists. In any case, local anti-evolutionists were not placated by the statement, with one declaiming, "Our children are not being educated; they are being indoctrinated." NCSE is monitoring the situation.

National: "The National Association of State Boards of Education will elect officers in July, and for one office, president-elect, there is only one candidate: a member of the Kansas school board who supported its efforts against the teaching of evolution," *The New York Times* reported (2007 May 19). The candidate in question is Kenneth R Willard, who won the Republican nomination for the District 7 seat on the Kansas state board of education in the August 2006 primary and then narrowly defeated Democrat Jack Wempe in the November 2006 general election (see *RNCSE* 2006 Sep/Oct; 26 [5]: 4–10). Willard's only opponent in the NASBE race withdrew for personal reasons. Although NASBE lacks any provision for write-in votes in its bylaws, GR "Sam" Schloemer, a supporter of science education who occupies the District 4 seat on the Ohio State Board of Education, expressed his willingness to serve if elected, telling the *Times*, "I would rather serve than see someone of his persuasion represent school boards across the country." Steve Rissing of the Ohio State University and Patricia Princehouse of Case Western Reserve University were quoted as worrying about Willard's using his influence as president-elect of NASBE to encourage attacks on evolution education; although Willard downplayed NASBE's influence, telling the *Times*, "We don't set curriculum standards or anything like that," he also said that he personally thought that "intelligent design" ought to be taught. Jack Krebs of Kansas Citizens for Science told the *Lawrence Journal-World* (2007 May 23) that Willard's advocacy for "intelligent design" was not the only worrying



THE DANGERS OF CREATIONISM IN EDUCATION

Motion for a recommendation presented by Mr McIntosh and others

This motion has not been discussed in the Assembly and commits only the members who have signed it.

1. The Assembly asserts the standard setting role of the Council of Europe and is aware of its own responsibility in re-assessing the basis on which our societies are to be built. It recognizes science as part of this basis.
2. The advance of scientific knowledge through the process of rational enquiry is thousands of years old. Ancient civilizations around the world made valuable contributions. Modern science started in Europe with the scientific revolution of the 15th and 16th centuries. This was followed by the Age of Enlightenment in the 18th and has continued to the present. New theories were seldom easily accepted by the establishment, as was the case for instance with Lamarck and Darwin's work on evolution in the 19th century.
3. However, in recent years we have witnessed attempts to reconcile the biblical account of creation with modern science and outlaw the theory of evolution. "Creationists" pretend that "intelligent design" by a supreme entity is the scientific explanation for the universe.
4. Such an approach has no credibility among the scientific community but has succeeded in raising doubts in less informed minds, including persons with high political responsibilities, mainly in the USA but also in Europe. Some schools are now forced to teach creationism. The middle path of providing equal time for both merely offers a middle way between truth and falsehood.
5. Support for the scientific theory of evolution is almost universal among those with religious beliefs in Europe and nothing in this motion is intended as disrespect for any religion.
6. However, the Assembly is concerned at the possible negative consequences of the promotion of creationism through education and recommends that the Committee of Ministers assess the situation in the Council of Europe member countries and propose adequate counter-measures.

[See <http://assembly.coe.int/Main.asp?link=/Documents/WorkingDocs/Doc06/EDOC11065.htm> for the original and a list of signatories.]

aspect of his candidacy: "He ... and his cohorts on the old board seemed quite willing to exercise their majority rule to do a lot of things that were not in the best interest of education," Krebs said. Votes for NASBE officers are cast by state boards of education; the *Times* later reported (2007 Jun 21) that NASBE officials were reviewing their election procedures to determine how write-in votes ought to be treated.

Europe: Creationism was on the mind of the Council of Europe recently. On October 4, 2006, a proposal that described creationism as having "no credibility among the scientific community" and expressed concern "at the possible negative consequences of the promotion of creationism through education" was introduced in the

Council of Europe's Parliamentary Assembly (see box, above). In response, the Assembly's Committee on Culture, Science, and Education subsequently produced a report dated June 8, 2007. Entitled "The dangers of creationism in education," the report (available on-line at <http://assembly.coe.int/Main.asp?link=/Documents/WorkingDocs/Doc07/EDOC11297.htm>) consists of a summary, a nineteen-point draft resolution expressing concern "about the possible ill-effects of the spread of creationist theories within our education systems and about the consequences for our democracies" (see p 7), and a 10 000-word explanatory memorandum discussing the creationism/evolution controversy, particularly as it exists in Europe.

The summary of "The dangers of creationism in education" reads:

The theory of evolution is being attacked by religious fundamentalists who call for creationist theories to be taught in European schools alongside or even in place of it. From a scientific view point there is absolutely no doubt that evolution is a central theory for our understanding of the Universe and of life on Earth.

Creationism in any of its forms, such as "intelligent design", is not based on facts, does not use any scientific reasoning and its contents are pathetically inadequate for science classes.

The Assembly calls on education authorities in member States to promote scientific knowledge and the teaching of evolution and to oppose firmly any attempts at teaching creationism as a scientific discipline.

The Parliamentary Assembly was scheduled to vote on the draft resolution on June 26; Reuters reported (2007 Jun 20), "Europe's main human-rights body will vote on a proposal next week to defend the teaching of evolution and to keep creationis[m] and 'intelligent design' out of science class in state schools in its 47 member countries. The unusual move shows that a US trend for religiously based attacks on the theory of evolution is also worrying European politicians, who now see such arguments put forward in their countries by Christian and Islamic groups."

The vote was cancelled on June 25, and the report was returned to the Committee on Culture, Science, and Education, because, according to Reuters (2007 Jun 25), the resolution was deemed one-sided. However, the report of the day's proceedings (available on-line at <http://assembly.coe.int/Main.asp?link=/Documents/Records/2007/E/0706251130E.htm>) suggests that there were two concerns advanced: that the report was "unbalanced" (with no indication of how) and that the topic of creationism was not appropriate for the Council to address.

THE DANGERS OF CREATIONISM IN EDUCATION

DRAFT RESOLUTION

- 1 The Parliamentary Assembly is worried about the possible ill-effects of the spread of creationist theories within our education systems and about the consequences for our democracies. If we are not careful, creationism could become a threat to human rights, which are a key concern of the Council of Europe.
- 2 Creationism, born of the denial of the evolution of species through natural selection, was for a long time an almost exclusively American phenomenon. Today creationist theories are tending to find their way into Europe and their spread is affecting quite a few Council of Europe member states.
- 3 The prime target of present-day creationists, most of whom are Christian or Muslim, is education. Creationists are bent on ensuring that their theories are included in the school science syllabus. Creationism cannot, however, lay claim to being a scientific discipline.
- 4 Creationists question the scientific character of certain items of knowledge and argue that the theory of evolution is only one interpretation among others. They accuse scientists of not providing enough evidence to establish the theory of evolution as scientifically valid. On the contrary, they defend their own statements as scientific. None of this stands up to objective analysis.
- 5 We are witnessing a growth of modes of thought which, the better to impose religious dogma, are attacking the very core of the knowledge that we have patiently built up on nature, evolution, our origins and our place in the universe.
- 6 There is a real risk of a serious confusion being introduced into our children's minds between what has to do with convictions, beliefs and ideals and what has to do with science, and of the advent of an "all things are equal" attitude, which may seem appealing and tolerant but is actually disastrous.
- 7 Creationism has many contradictory aspects. The "intelligent design" theory, which is the latest, more refined version of creationism, does not deny a certain degree of evolution but claims that this is the work of a superior intelligence and not natural selection. Though more subtle in its presentation, the doctrine of "intelligent design" is no less dangerous.
- 8 The Assembly has constantly insisted that science is of fundamental importance. Science has made possible considerable improvements in living and working conditions and is a not insignificant factor in economic, technological and social development. The theory of evolution has nothing to do with divine revelation but is built on facts.
- 9 Creationism claims to be based on scientific rigour. In actual fact the methods employed by creationists are of three types: purely dogmatic assertions; distorted use of scientific quotations, sometimes illustrated with magnificent photographs; and backing from well-known scientists, most of whom are not biologists. By these means creationists seek to appeal to non-specialists and sow doubt and confusion in their minds.
- 10 Evolution is not simply a matter of the evolution of humans and of populations. Denying it could have serious consequences for the development of our societies. Advances in medical research with the aim of effectively combating infectious diseases such as AIDS are impossible if every principle of evolution is denied. One cannot be fully aware of the risks involved in the significant decline in biodiversity and climate change if the mechanisms of evolution are not understood.
- 11 Our modern world is based on a long history, of which the development of science and technology forms an important part. However, the scientific approach is still not well understood and this is liable to encourage the development of all manner of fundamentalism and extremism, synonymous with attacks of utmost virulence on human rights. The total rejection of science is definitely one of the most serious threats to human rights and civic rights.
- 12 The war on the theory of evolution and on its proponents most often originates in forms of religious extremism which are closely allied to extreme right-wing political movements. The creationist movements possess real political power. The fact of the matter, and this has been exposed on several occasions, is that the advocates of strict creationism are out to replace democracy by theocracy.
- 13 All leading representatives of the main monotheistic religions have adopted a much more moderate attitude. Pope Benedict XVI, for example, as his predecessor Pope John-Paul II, today praises the role of the sciences in the evolution of humanity and recognizes that the theory of evolution is "more than a hypothesis".
- 14 The teaching of all phenomena concerning evolution as a fundamental scientific theory is therefore crucial to the future of our societies and our democracies. For that reason it must occupy a central position in the curriculum, and especially in the science syllabus. Evolution is present everywhere, from medical overprescription of antibiotics that encourages the emergence of resistant bacteria to agricultural overuse of pesticides that causes insect mutations on which pesticides no longer have any effect.
- 15 The Council of Europe has highlighted the importance of teaching about culture and religion. In the name of freedom of expression and individual belief, creationist theories, as any other theological position, could possibly be presented as an addition to cultural and religious education, but they cannot claim scientific respectability.
- 16 Science provides irreplaceable training in intellectual rigour. It seeks not to explain "why things are" but to understand how they work.
- 17 Investigation of the creationists' growing influence shows that the arguments between creationism and evolution go well beyond intellectual debate. If we are not careful, the values that are the very essence of the Council of Europe will be under direct threat from creationist fundamentalists. It is part of the role of the Council's parliamentarians to react before it is too late.
- 18 The Parliamentary Assembly therefore urges the member states, and especially their education authorities, to:
 - 18.1 defend and promote scientific knowledge;
 - 18.2 strengthen the teaching of the foundations of science, its history, its epistemology and its methods alongside the teaching of objective scientific knowledge;
 - 18.3 make science more comprehensible, more attractive and closer to the realities of the contemporary world;
 - 18.4 firmly oppose the teaching of creationism as a scientific discipline on an equal footing with the theory of evolution by natural selection and in general resist presentation of creationist theories in any discipline other than religion;
 - 18.5 promote the teaching of evolution by natural selection as a fundamental scientific theory in the school curriculum.
- 19 The Assembly welcomes the fact that, in June 2006, 27 Academies of Science of Council of Europe member states signed a declaration on the teaching of evolution and calls on academies of science that have not yet done so to sign the declaration.

[See <http://assembly.coe.int/Main.asp?link=/Documents/WorkingDocs/Doc07/EDOC11297.htm> for the original, of which the present selection is section A.]



Disappointed, Guy Lengagne, the French Socialist member of the Assembly who produced the report, told Reuters, "I have enough experience of parliamentary procedure to know that this is a first-class burial"; he was later quoted by Agence France Press (2007 Jun 26) as describing the vote as "a ploy on the part of people who will use any means they can to combat the theory of evolution and impose creationist ideas." In a June 26, 2007, statement (available on-line at <<http://assembly.coe.int/ASP/APFeaturesManager/defaultArtSiteView.asp?ID=686>>), the Committee on Culture, Science, and Education protested the vote (conducted, it claimed, "under confused and probably irregular conditions") and expressed its intention to return the resolution to the agenda in October 2007.

Russia: The prospect of a Scopes trial in reverse surfaced in Saint Petersburg, Russia, in July 2006, when a schoolgirl, Maria Schraiber, filed suit against the city education committee and federal education ministry to force the teaching of creationism. Schraiber, represented by her father Kirill Schraiber, claimed that the biology textbook used by the majority of Russian high school students is anti-religious and that students should be allowed to learn creationism as well as evolution. The *Baltimore Sun* reported (2007 Jan 3) that a family friend with a publicity firm was supporting the suit: "Vuima, whose firm goes by the slogan, 'We Create Sensations,' believes that nothing short of society's collapse is at stake when it comes to the teaching of evolution. He, like the lawsuit, contends that Darwinism, while not a political ideology, stems from Marxist-Leninist ideology; after all, both Darwin and Karl Marx, who is said to have offered to dedicate *Das Kapital* to the scientist, wrote of grand struggles for survival." Also reportedly sympathetic to the suit were clergy in the Russian Orthodox Church, including its spiritual leader, Patriarch Alexius II. But the principal at Schraiber's school was dismissive, saying, "It seems to everyone that this is stupid and serves no purpose. ... Pupils and teachers are more amused than concerned about it"

(Associated Press, 2006 Dec 13). Subsequently, according to the RIA Novosti news agency, Schraiber departed Russia for the Dominican Republic; though the suit continued in her absence, it was finally dismissed on February 21, 2007 (see <<http://en.rian.ru/russia/20070221/61084667.html>>). According to Radio Free Europe's report on the case (2006 Mar 10; available on-line at <<http://www.rferl.org/featuresarticle/2006/03/c847984f-4125-404f-9f71-7d22c229112c.html>>), 26% of Russians accept evolution and 49% accept creationism, but a 2003 poll reported that 44% agreed with "Human beings are developed from earlier species of animals," a result that places Russia slightly ahead of the United States (see National Science Board, *Science and Engineering Indicators 2006* [Arlington (VA): National Science Foundation, 2006], vol 2, table 7-10).

United Kingdom: In response to a petition from the Science, Just Science campaign (<<http://www.justscience.org.uk>>) asking the Prime Minister to "prevent the use of creationist and other pseudo-scientific propaganda in Government-funded schools," the Prime Minister's office issued the following statement (available on-line at <<http://www.number-10.gov.uk/output/Page12021.asp>>) on June 21, 2007:

The Government remains committed to ensuring that young people have an understanding of the importance of science and the world around them.

Science is a core subject of the National Curriculum throughout every Key Stage. The National Curriculum secures for all pupils, irrespective of background and ability, an entitlement to a range of areas of learning. Its aim is to develop the knowledge, understanding, skills and attitudes necessary for each pupil's self-fulfilment and development as an active and responsible citizen. It makes expectations for learning and attainment explicit to pupils, parents, teachers, governors, employers and the public, and estab-

lishes national standards for the performance of all pupils. All materials that support the teaching, learning and assessment of primary and secondary education, can be found on the National Curriculum website [<<http://www.nc.uk.net/>>].

The Government is aware that a number of concerns have been raised in the media and elsewhere as to whether creationism and intelligent design have a place in science lessons. The Government is clear that creationism and intelligent design are not part of the science National Curriculum programmes of study and should not be taught as science. The science programmes of study set out the legal requirements of the science National Curriculum. They focus on the nature of science as a subject discipline, including what constitutes scientific evidence and how this is established. Students learn about scientific theories as established bodies of scientific knowledge with extensive supporting evidence, and how evidence can form the basis for experimentation to test hypotheses. In this context, the Government would expect teachers to answer pupils' questions about creationism, intelligent design, and other religious beliefs within this scientific framework.

We will be publishing guidance for schools, on the way creationism and intelligent design relate to science teaching. It will be possible to ensure that the weight of scientific opinion is properly presented. The guidance will be available on the Qualifications and Curriculum Authority website in due course.

The petition, and the government's response, occurs against the background of a propaganda blitz on the part of a newly formed creationist organization styling itself Truth in Science. In September 2006, Truth in Science sent packets of creationist teaching material, including two "intelligent



design" DVDs, to the science heads of every secondary school (of which there are about 5700) in the United Kingdom. On November 1, 2006, the Secretary of State for Education and Skills replied to a member of parliament's question about the Truth in Science packets by saying, "Neither intelligent design nor creationism are recognised scientific theories and they are not included in the science curriculum," adding, "the Truth in Science information pack is therefore not an appropriate resource to support the science curriculum" (see <<http://www.publications.parliament.uk/pa/cm200506/cmhansrd/cm061101/text/61101w0010.htm#0611021001582>>).

According to the *Telegraph* (2006 Nov 28), however, there was concern that the government's disclaimers are insufficient. James Williams, head of science teacher training at Sussex University, told the newspaper that hundreds of schools may be teaching creationism in science classes: "The problem we have got is that no one has carried out any proper research to find out how widespread the teaching of creationism and aspects of creationism are in science." Williams also blamed the government for failing to resolve ambiguity in its guidelines for biology curricula, such as a syllabus that required students to be able to "explain that the fossil record has been interpreted differently over time ([such as] creationist interpretation)," leading to confusion that creationists are now exploiting. The *Telegraph* also reported that "a spokesman for the DfES [Department for Education and Skills] said that new guidance would clarify its position that creationism cannot be debated in science." Similarly, the *Guardian* (2006 Dec 7) reported that the British government is preparing to "write to schools telling them that controversial teaching materials promoting creationism should not be used in science lessons." The statement from the Prime Minister's office seems to indicate that the promised guidance is still under development.

OBITUARIES

Jerry Falwell

JERRY FALWELL, the fundamentalist preacher and activist, died on May 15, 2007, in Lynchburg, Virginia, at the age of 73. Born in 1933 in Lynchburg, he was saved, he reported, on January 20, 1952, and bought a Bible the next day and decided two months later to become a minister. He graduated from Bible Baptist College in Springfield, Missouri, in 1956, and became the founding pastor of the Thomas Road Baptist Church of Lynchburg in the same year. From his base in Lynchburg his efforts expanded steadily, including the "Old-Time Gospel Hour" show (broadcast first in 1956 and nationally in 1971), Lynchburg Bible College (founded in 1971 and later renamed Liberty University), and the Moral Majority (founded in 1979 and disbanded in 1989), which helped to organize the participation of religious conservatives in politics: the goal of the Moral Majority, he said, was "Get them saved, baptized, and registered." Falwell was a controversial public figure, and even after his political influence waned when the Moral Majority was disbanded, he was still a reliable source of outrageous remarks, as when he blamed the 9/11 attacks in part on feminists, gays and lesbians, and the ACLU.

A young-earth creationist himself, Falwell publicized and supported the work of the Institute for Creation Research and later Answers in Genesis. It was perhaps at Liberty University that his creationist views were most visible, however. In the 1980s, discovering that students trained in creationism at Lynchburg Bible College (as it then was) were teaching biology in public high schools, the Virginia ACLU filed a complaint with the state board of education. LBC responded by removing creationism from the biology department while instituting a

new unit called the Center for Creation Studies, where all students were (and are) required to take a course called "History of Life" in order "to increase their appreciation of the rational basis of their faith and to equip them to deal with the creation-evolution controversy." Also at Liberty University was a creationist Museum of Earth and Life History, designed by Lane Lester, a former ICR staffer; according to Susan Friend Harding's *The Book of Jerry Falwell* (Princeton [NJ]: Princeton University Press, 2000), it was closed in the early 1990s. Both the ICR's Henry M. Morris and AiG's Ken Ham have received honorary doctorates from Liberty University.

F Clark Howell



F Clark Howell at the NCSE office holiday party, December 2005.
Photograph: Philip T. Spieth.

F CLARK HOWELL, Professor Emeritus of Anthropology at the University of California, Berkeley, and a supporter of NCSE, died on March 10, 2007, at his home in Berkeley, at the age of 82. Born on November 27, 1925, in Kansas City, he received bachelor's, master's, and doctoral degrees from the University of Chicago. Howell taught anatomy at Washington University before returning to the University of Chicago to teach anthropology from 1955 to 1970. In 1970, he moved to UC Berkeley, where he remained until retiring in 1991. He continued to be very active

in research and publication until his death. Howell was a central figure in the development of paleoanthropology as a science in the second half of the 20th century. He pursued extensive and groundbreaking fieldwork on human evolution, archeology, and paleontology in Africa, Europe, and Asia. A pioneer in the organization of multi-disciplinary research teams, he brought together geologists, paleontologists, biologists, archaeologists, and physical anthropologists to investigate the fossil record of human evolution from many perspectives. Howell was a member of the National Academy of Sciences, a fellow or member of many other scientific societies, and a recipient of the Charles Darwin Award for Lifetime Achievement in Physical Anthropology from the American Association of Physical Anthropologists.

In addition to his research and teaching, Howell was also very committed to public education about human evolution and the fossil record. He was involved in the 1960s in the Hominid Casting Program of the Wenner-Gren Foundation for Anthropological Research, which produced and distributed high-quality casts of significant fossils. He was a trustee and head of the Science and Grants Committee of the LSB Leakey Foundation for many years, supporting such programs as the "Stones and Bones" high school curriculum in human evolution. He was an advisor to documentary specials and museum exhibits on the fossil record, as well as the *Encyclopedia Britannica*. It is perhaps ironic that his most persistent contribution to public understanding of and debate about human evolution will probably be the book *Early Man*, first published in 1965. This widely distributed volume in the Time-Life Nature series contained a fold-out graphic depicting a sequence of recon-

structions of extinct fossil hominins walking across the page. Although not intended to depict a simple linear course of human evolution, and not the first such illustration, this graphic is the ultimate source of nearly all such illustrations still used today, both in the creationist literature and in popular science media.

Stanley Miller

STANLEY MILLER, a pioneer in scientific research on the origin of life, died on May 20, 2007, at the age of 77, in National City, California. Born in Oakland, California, in 1930, Miller received his bachelor's degree from the University of California, Berkeley, in 1951, and his doctorate from the University of Chicago in 1954. As a graduate student at Chicago under the supervision of Harold C. Urey, he conducted his famous experiment demonstrating the abiotic synthesis of organic compounds under conditions resembling those of the early earth; he published a report ("Production of amino acids under possible primitive earth conditions") on the experiment in the journal *Science* in 1953 (117: 528-9; available online at <<http://www.issol.org/miller/miller1953.pdf>>). After a postdoctoral year at Caltech and five years at Columbia University, he joined the faculty at the University of California, San Diego, where he spent the rest of his productive scientific career. He was a member of the National Academy of Sciences and was awarded the Oparin Medal from the International Society of the Study of the Origin of Life in 1983.

Miller's experiment ushered in a new era of experimental studies of prebiological chemistry. Moreover, according to Jeffrey D. Bada, one of Miller's graduate students who is now himself a leading expert on the origin of life, "The public's imagination was captivated by the

outcome of the experiment ... By the time the results were corroborated by an independent group three years later, the metaphor of the 'prebiotic soup' had found its way into comic strips, cartoons, movies and novels" (as quoted in UCSD's obituary for Miller). Biology textbooks came to feature a diagram of Miller's apparatus and a brief explanation of its significance. Unsurprisingly, creationists have repeatedly attacked both the textbook presentation and the scientific research itself; see chapter 1 of Alan Gishlick's *Icons of Evolution?* (available on NCSE's website) for a detailed rebuttal of one such attack. Meanwhile, scientific research on the origin of life continues to advance, thanks in large part to the pioneering work of Stanley Miller.

Norma Gabler

NORMA GABLER, the conservative textbook activist, died on July 22, 2007, at the age of 84. Born Norma Elizabeth Rhodes in Garrett, Texas, on June 16, 1923, she married Mel Gabler (1915-2004) in 1942. The couple was known for their critiques of textbooks used in Texas's public schools. They began to scrutinize textbooks for hints of "secular humanism" starting in 1961, and incorporated the nonprofit Educational Research Analysts (ERA) in 1973.

The obituary in *The New York Times* (2007 Aug 1) quoted Steven Schafersman's description of the Gablers in *Creation/Evolution* (1982 Fall; 3 [4]: 30-4) as "the most effective textbook censors in the country." Changes in the Texas political landscape and opposition from science education groups weakened ERA's influence later in the 1980s, but Norma Gabler was on hand during the latest round of biology textbook adoptions in 2003, and ERA is expected to be engaged in the 2009 biology textbook adoption

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!

Tim Berra spoke on “Charles Darwin: The man (1809–1882)” at Centre College in Danville, Kentucky, on February 5, 2007, covering the life of Darwin from birth to death and including commentary on his family, friends, books, and significance to Western thought. Berra is professor emeritus of evolution, ecology, and organismal biology at the Ohio State University, Mansfield, and the author of *Evolution and the Myth of Creationism* (Stanford [CA]: Stanford University Press, 1990).

NCSE’s deputy director **Glenn Branch**’s “Understanding creationism after *Kitzmiller*” appeared in *BioScience* (2007 Mar; 57 [3]: 278–84) — a review essay of “the recent spate of books — from 2005 to the first quarter of 2007 — that variously seek to examine the course of the [*Kitzmiller v Dover*] trial, to explain the history of creationism, to expose its scientific failure, to explore the theological alternatives to creation, or simply to expound the basic issues to (in the *Quarterly Review of Biology*’s charming phrase) ‘tyros and laics.’” The books he discussed were Matthew Chapman’s *40 Days and 40 Nights*, Gordy Slack’s *The Battle over the Meaning of Everything*, Edward Humes’s *Monkey Girl*, **Barbara Forrest** and **Paul R Gross**’s *Creationism’s Trojan Horse*, Ronald L. Numbers’s *The Creationists*, **Michael Ruse**’s *The Evolution-Creation Struggle*, **Arthur McCalla**’s *The Creationist Debate*, **Matt Young** and **Taner Edis**’s collection *Why Intelligent Design Fails*, **Andrew J Petto** and **Laurie R Godfrey**’s collection *Scientists Confront Intelligent Design and Creationism*, **Mark Isaak**’s *The Counter-Creationism Handbook*, **Francisco J Ayala**’s *Darwin and Intelligent Design*, Joan Roughgarden’s *Evolution and Christian Faith*, the AAAS-pro-

duced *The Evolution Dialogues*, Christopher Carlisle and WT Smith Jr.’s *The Complete Idiot’s Guide to Understanding Intelligent Design*, Michael Shermer’s *Why Darwin Matters*, and **Philip Kitcher**’s *Living with Darwin*. He also mentioned the film *Flock of Dodos* and two blogs, **PZ Myers**’s Pharyngula and the collectively authored *The Panda’s Thumb*. Branch concluded, “Despite the profusion of information confirming that ‘intelligent design’ is scientifically bankrupt, conceptually and historically entangled with creationism, and theologically contestable, the teaching of evolution in the public schools of the United States remains under siege ... It is a daunting challenge to take action to promote the teaching of evolution under such difficult conditions ... But if you find yourself in need of inspiration, you only have to look to the shining example of 11 brave parents in Dover, Pennsylvania, who took a stand in defense of the integrity of education by serving as plaintiffs in the *Kitzmiller* case.” Of interest in the same issue of *BioScience* were Rose H. Nehm and Leah Reilly’s “Biology majors’ knowledge and misconceptions of natural selection” (263–72); Marc Mangel’s review essay “New views on religion and science”, discussing EO Wilson’s *The Creation*, Joan Roughgarden’s *Evolution and Christian Faith*, and Francis J. Collins’s *The Language of God* (273–7); and Peter J. Bowler’s review of David Quammen’s *The Reluctant Mr Darwin* (287–8).

The March/April 2007 issue of *Skeptical Inquirer* (31: 2) was devoted to “Science, God, and (non) belief,” and unsurprisingly NCSE members were represented. **Frederick Crews** contributed “Follies of the wise” (27–30), adapted from his new collection of the same title (Emeryville, CA: Shoemaker and Hoard, 2006), extolling science as “a collective means of generating and testing hypotheses. Its trials eventually

weed out error with unmatched success.” NCSE Supporter **Michael Ruse** contributed “Fighting the fundamentalists: Chamberlain or Churchill?” (38–41), responding to Richard Dawkins’s comparison of those who, like Ruse, “have no religious belief but who think that one should collaborate with liberal Christians against a shared enemy [that is, creationists]” with Neville Chamberlain, the British prime minister who tried to appease Adolf Hitler. **Daniel C Dennett** contributed “Thank goodness!” (42–4), explaining his secular form of his gratitude in the wake of his emergency heart surgery in late 2006. Peter Olofsson’s “The Coulter hoax” (48–50) sarcastically praises Ann Coulter for her satire of “intelligent design” creationism in her book *Godless*. Also of interest were a brief news article by Greg Martinez about the conviction of the flamboyant young-earth creationist Kent Hovind on charges of federal tax fraud (9), Massimo Pigliucci’s answer to the question “Is there such a thing as macroevolution?” (18–9), **Stanley A Rice**’s humorous column about the nutritional value of a literal reading of the Bible (64), Kendrick Frazier’s review of Richard Dawkins’s *The God Delusion* (65–6), and **William D Stansfield**’s review of Donald B. DeYoung’s *Astronomy and the Bible* (69, 71). The issue also contained **Dave Thomas**’s list of New Mexicans for Science and Reason’s “Annual Best and Worst Awards for 2006” (11), including the “Thanks for saving us [from] being total losers” award to Turkey, the only nation discussed in Jon D. Miller, **Eugenie C. Scott**, and Shinji Okimoto’s 2006 article “Public acceptance of evolution” (*Science* 313: 765) with a lower rate of accepting evolution than the United States; the “You dodged a bullet” award to the Rio Rancho, New Mexico, School Board for amending a policy friendly to “intelligent design”; the “Thousands or billions? Even 288

years can seem like a *long* time” award to Kent Hovind, who faced up to 288 years of jail time; the “Judith Regan of creationism” award to Ann Coulter, whose book *Godless* included a “pathetic rant” against evolution; the “New word: Pignorant” award to Jonathan Wells for his *The Politically Incorrect Guide to Darwinism and Intelligent Design*; and the “Last nail in the coffin of ID” award to William Dembski for his on-line animated video complaining — in a particularly childish way — of the decision in *Kitzmiller v Dover*.

NCSE Supporter **Niles Eldredge** and **Kent E Holsinger** were among the recipients of awards from the American Institute for Biological Sciences for 2007, as reported in *BioScience* (2007 May; 57 [5]: 458–60). Eldredge, who serves as curator in the Department of Invertebrates at the American Museum of Natural History, received the President’s Citation Award, “which recognizes meritorious accomplishment by an individual (or group) in the biological sciences”; his work on the new journal *Evolution: Education and Outreach* and on the AMNH’s exhibit on Darwin were especially prominent in the citation. Holsinger, a professor in the Department of Ecology and Evolutionary Biology at the University of Connecticut, received the Past-President’s Award, “which recognizes the services of the immediate past-president of AIBS.”



Barbara Forrest

Barbara Forrest wrote a position paper entitled “Understanding the intelligent design creationist movement: Its true nature and goals” for the Center for Inquiry, which seeks “to promote and defend reason, science, and freedom of inquiry in all areas of human endeavor.” The paper (available on-line at <<http://www.centerforinquiry.net/uploads/attachments/intelligent-design.pdf>>) examines “the ID

movement’s organization, its historical and legal background, its strategy and aims, and its public policy implications,” arguing that, “In promoting ‘intelligent design theory’ — a term that is essentially code for the religious belief in a supernatural creator — as a purported scientific alternative to evolutionary theory, the ID movement continues the decades-long attempt by creationists either to minimize the teaching of evolution or to gain equal time for yet another form of creationism in American public schools. Accordingly, the ID creationist movement threatens both the education of the nation’s children and the constitutional separation of church and state, which protects the religious freedom of every American.” Barbara Forrest is a professor of philosophy at Southeastern Louisiana University and a member of NCSE’s board of directors; with **Paul R Gross** she wrote *Creationism’s Trojan Horse: The Wedge of Intelligent Design* (New York: Oxford University Press, 2004), the definitive exposé of the “intelligent design” movement’s so-called Wedge strategy, recently published in paperback with a new chapter about *Kitzmiller v Dover*. Forrest testified for the plaintiffs in the *Kitzmiller* trial, and Judge Jones wrote in his ruling, “Dr Barbara Forrest ... has thoroughly and exhaustively chronicled the history of ID in her book and other writings for her testimony in this case. Her testimony, and the exhibits ... admitted with it, provide a wealth of statements by ID leaders that reveal ID’s religious, philosophical, and cultural content.”

When Richard Dawkins was profiled in the *Time 100* — a list of “the 100 men and women whose power, talent or moral example is transforming the world” — the “intelligent design” proponent Michael Behe was selected to write a short description of him (*Time* 2007 May 14), which elicited a response from **Michael R Freeman**: “As a long-term subscriber, I was deeply disappointed that you chose creationist Michael Behe to write the piece on biologist Richard Dawkins. Dawkins is a prominent and well-respected scientist and a highly successful sci-

ence educator for the lay audience. In marked contrast, Behe’s writings and public appearances have damaged science education and practice in this country. Of all of the distinguished scientists and writers *Time* might have chosen to describe Dawkins and his work, it is astonishing that your magazine settled on Behe. This terrible error of judgment is indicative of either inexcusable ignorance about the state of modern science or a deliberate willingness to help perpetuate the mythology that the theory of evolution is a controversy rather than a fact comparable to the theory of gravity” (*Time* 2007 May 28). Freeman is the David E Retik Director of Basic Urologic Research at Children’s Hospital Boston and Associate Professor of Surgery at Harvard Medical School. Also in the *Time 100* list was NCSE Supporter **Neil deGrasse Tyson**, director of the American Museum of Natural History’s Hayden Planetarium.

Daniel K Gladish wrote a letter to the editor of the *Hamilton, Ohio, Journal News* (2007 May 24) to refute a previous letter from a local creationist. He explained that evolution is not a hypothesis but a well-established scientific theory that is not in dispute in science, that “[i]t is utterly false that ‘not one’ transitional form has been found in the fossil record,” and that creationists are ignoring the scientific facts. “Do I have a closed mind?” he wrote. “I don’t think so. I started as a creationist and changed due to convincing evidence. But I am tired of responding to the same 150-year-old, long-discredited arguments.” Gladish is Associate Professor of Botany and Director of the Conservatory at Miami University.

Thomas Gregg and two of his colleagues at Miami University, Jnanendra K Bhattacharjee and Gary Janssen, collaborated on a column about the Answers in Genesis Creation Museum for the *Hamilton, Ohio, Journal News* (2007 May 27). “From the material on their web site and other writings and preachings of Answers in Genesis, we can anticipate that their museum will claim that the scientific evidence actually supports the Genesis account of cre-

ation. Such a claim is supported by distorting some scientific evidence and ignoring most of it. This undermines the credibility of science itself at a time when we should be strengthening science education," they wrote, concluding, "It is important to remind our teachers, our education leaders, our public officials, our legislators, concerned parents and ourselves that a commitment to science education is essential for bolstering America's faltering leadership in science and technology globally. Supporting the creationist museum, instead of supporting rigorous science education, will not help us achieve this leadership goal."

Mark Isaak's *The Counter-Creationism Handbook* (Berkeley [CA]: University of California Press, 2007) was praised in a column in the *Buffalo News* (2007 Jun 10). Gerry Rising wrote, "an excellent new resource is available. ... This book responds to more than 400 individual arguments posed by creationists. That number alone suggests how difficult it is for an individual to be able to answer the wide range of attacks. The responses here are organized under philosophy and theology, biology, paleontology, geology, astronomy and cosmology, miscellaneous anti-evolution, Biblical creationism, 'intelligent design' and 'other' creationism topics. Individual questions offer source quotations, point-by-point responses and references for further reading." Rising also summarized and praised **Charles L Rulon's** article for *Skeptical Inquirer* (2007 May/Jun; 31 [3]: 63-4) on debating creationists (see below).

A special issue of *Skeptic* (2007; 13 [1]) commemorating the tenth anniversary of Carl Sagan's death contained a number of tributes, including **David Morrison's** "Carl Sagan and Edward Teller: An uneasy alliance over defending the earth" and NCSE Supporter **Bill Nye** "The Science Guy's" "Our place in the universe" (56-7) in Sagan's memory. Also of interest in the same issue of *Skeptic* was Nathan Aviezer's "Jews for Darwin", arguing that evolution is, and "intelligent design" is not, theologically acceptable to Orthodox Jews; he was writing in reaction to

Alexander Nussbaum's essay "Orthodox Jews and science" (*Skeptic* 2006; 12 [3]: 29-35), which characterized Aviezer as a "typical Orthodox Jewish scientist who denies evolution" (10-2). Additionally, John Cross asked, "Was Louis Pasteur anti-evolution?" (13); Robert K Eberle reviewed Francis S Collins's *The Language of God* (New York: The Free Press, 2006), praising the book's scientific defense of evolution (78-9); and the *Junior Skeptic* insert (79-89) was taken up with the first part of a two-part examination of evolution.

Kevin Padian was in the news for scientific research conducted with Cynthia Marshall Faux, a veterinarian and paleontologist at the Museum of the Rockies. As David Perlman wrote in the *San Francisco Chronicle* (2007 Jun 6), "A dinosaur mystery that puzzled paleontologists for nearly a century has been solved by a pound of beef tendons from a butcher, a collection of dead hawks and a brace of frozen quail." In a recent paper ("The opisthotonic posture of vertebrate skeletons: Postmortem contraction or death throes?" *Paleobiology* 2007 May; 33: 201-26), Padian and Faux argue that the prevalent posture of fossil dinosaurs — with their heads, necks, and feet arched backward — was due to their death throes. Using a smorgasbord of modern animals, Faux devised experiments, which Padian described as "powerful kitchen science," to show that postmortem contractions would not have produced the posture typical of dinosaur fossils. That posture, known as opisthotonus, occurs in death only in warm-blooded animals such as birds and mammals, Padian told the *Chronicle*, so their work offers new support for the idea that dinosaurs were warm-blooded. Padian is Professor of Integrative Biology at the University of California, Berkeley, and Curator of Paleontology at the University of California Museum of Paleontology; he also serves as president of NCSE's board of directors.

Charles L Rulon contributed a piece on "Debating creationists" to *Skeptical Inquirer* (2007 May/Jun; 31 [3]: 63-4), consisting of his opening remarks in a debate with a creationist. "Have I actually delud-

ed myself into thinking that I have some silver bullet arguments to convert the creationists in today's argument?" he rhetorically asked. "Hardly ... The only way creationists have been defeated, so far, from introducing their anti-evolution beliefs into public school science classes has been in court cases where their phony science has been exposed." Arguing that science educators have a duty to defend the scientific method, he still expressed qualms about the idea of a debate, listing five reasons not to debate creationists. In the end, though, he explained that he was debating to help to counteract the "large numbers of scientifically ignorant, politically active Christians who are locked into ultra-religious, anti-scientific views and who want to force these views on others through our elected officials, our courts, and our schools." Rulon is a professor emeritus of biology at Long Beach City College. Of interest in the same issue of *Skeptical Inquirer* was a report of a new play entitled *Darwin's Nightmare* (9, 11); a report that NCSE Supporter **Philip Kitcher** was the first recipient of the Prometheus Prize, awarded to "a distinguished philosopher in recognition of his or her lifetime contribution to expanding the frontiers of research in philosophy and science" (15); a review of Cameron M Smith and Charles Sullivan's *The Top Ten Myths about Evolution* (Amherst [NY]: Prometheus Books, 2007; reviewed in *RNCSE* 2006 Nov/Dec; 26 [6]: 19-20) by Kenneth W Krause (56-7); comments on Jeff Meldrum's *Sasquatch: Legend Meets Science* by **David J Daegling** (60-1); and a letter from NCSE deputy director **Glenn Branch** commending *Why Intelligent Design Fails* (New Brunswick [NJ]: Rutgers University Press, 2004), edited by **Matt Young** and **Taner Edis**.

NCSE Supporter **Michael Ruse's** latest book *Darwinism and its Discontents* (New York: Cambridge University Press, 2006) was reviewed in *BioScience* (2007 May; 57 [5]: 446-8) by David Depew. While expressing reservations about "Ruse's portrait of Darwinism as a continuous, cumu-



lative, progressive research tradition set on the correct path by its ingenious founder,” which he regarded as unduly minimizing to “the contentiousness of the Darwinian tradition,” Depew highly praised the book overall: “It is simply amazing how much information and argumentation Ruse has packed into an average-sized trade book. I hope *Darwinism and Its Discontents* does what it is intended to do: change minds.”



Eugenie C. Scott

her dedication to promoting the sound teaching of science in schools across the country. She was described in a Rutgers publication as “a physical anthropologist and internationally recognized advocate of scientific literacy. Scott is the founding director of the National Center for Science Education, established in [1981] to defend the teaching of evolution in public school science classes. She is a Fellow of the American Association for the Advancement of Science and a former president of the American Association of Physical Anthropologists. She is a leading expert on creationism — including ‘intelligent design’ — and one of its strongest critics. Deeply committed to the separation of church and state, she believes that while instructors must respect their students’ religious views, science and evolution are not de facto antireligious, and schools should only allow science to be taught in science classes. One of her most visible recent efforts has been the six-year fight against the Kansas State Board of Education’s decision to remove evolution from that state’s testing standards.” The honorary degree was Scott’s fifth; she received honorary Doctor of Science degrees from McGill University in 2003, the Ohio State University in 2005, and Mount Holyoke College and the

University of Wisconsin, Milwaukee, in 2006.



Nicholas J. Matzke

NCSE’s executive director **Eugenie C. Scott** and **Nicholas J. Matzke**’s article “Biological design in science classrooms” was published in the *Proceedings of the National Academy of Science*, one of the world’s most-cited multidisciplinary scientific serials (2007 May 15; 104 suppl 1: 8669-76); the article is available on-line (in HTML format: <http://www.pnas.org/cgi/content/full/104/suppl_1/8669>; in PDF format: <http://www.pnas.org/cgi/reprint/104/suppl_1/8669.pdf>). The abstract reads:

Although evolutionary biology is replete with explanations for complex biological structures, scientists concerned about evolution education have been forced to confront “intelligent design” (ID), which rejects a natural origin for biological complexity. The content of ID is a subset of the claims made by the older “creation science” movement. Both creationist views contend that highly complex biological adaptations and even organisms categorically cannot result from natural causes but require a supernatural creative agent. Historically, ID arose from efforts to produce a form of creationism that would be less vulnerable to legal challenges and that would not overtly rely upon biblical literalism. Scientists do not use ID to explain nature, but because it has support from outside the scientific community, ID is nonetheless contributing substantially to a long-standing assault on the integrity of science education.

The article is the result of a talk that Scott gave at the Arthur M Sackler Colloquium of the National Academy of Sciences, “In the Light

of Evolution I: Adaptation and Complex Design,” held December 1–2, 2006, at the Arnold and Mabel Beckman Center of the National Academies of Sciences and Engineering in Irvine, California. Figures 1 and 2 from the article, showing a comparison of phrasing in the prepublication manuscripts of the “intelligent design” textbook *Of Pandas and People* and the famous “cdesign proponentsists” passage (the missing link between “creation science” and “intelligent design”) respectively, may be used without permission for noncommercial and educational use, pursuant to the NAS’s policy on rights and permissions, provided that the original source and copyright notice are cited.

NCSE’s executive director **Eugenie C. Scott** and NCSE Supporter **Kenneth R. Miller** were presented with the Exploratorium’s Outstanding Educator’s Award on April 4, 2007. The accomplishments for which they were honored were described in a press release:

Brown University Biology Professor, Dr. Kenneth Miller, is an expert in cell membrane structure and function. A prolific writer, Dr. Miller is the author of more than 50 scientific papers and reviews. He also coauthored three different high school and college biology textbooks that are used by millions of students nationwide. Dr. Miller is the author of *Finding Darwin’s God: A Scientist’s Search for Common Ground between God and Evolution* and served as a key witness for the plaintiffs in the Dover, Pennsylvania, “intelligent design” case. He has received numerous honors including 5 teaching awards and the President’s Citation Award for Distinguished Contributions to Biology Sciences.

Dr. Eugenie C. Scott is Executive Director of the National Center for Science Education, Inc., a not-for-profit membership organization of scientists, teachers, and others that works to improve

the teaching of evolution, and of science as a way of knowing. One of the country's foremost experts on evolution and intelligent design, Dr Scott has lent her expertise to numerous organizations, foundations, school boards and academies including the ACLU and the National Science Foundation. She has received numerous honors including the Bruce Alberts Award of the American Society for Cell Biology and the Isaac Asimov Science Award from the American Humanist Association. She has held elective offices in the American Anthropological Association and the American Association for the Advancement of Science.

Founded by physicist and educator Frank Oppenheimer in 1969, the Exploratorium has achieved worldwide recognition as the prototype for hands-on science museums around the world; it serves over 500 000 annual museum visitors from around the world.

NCSE Supporter **James W Skehan SJ** was honored by the Geological Society of America with an all-day symposium at its Northeastern Section meeting, held March 12-14, 2007, at the University of New Hampshire. The meeting's description of the symposium read, "Father Jim, as he is known to one and all around the world, has had a long, distinguished, and varied career, extending for over half a century. This symposium is to recognize and commemorate his many contributions, particularly those to the geology of the northern Appalachians. He was one of the first to recognize the importance of plate tectonics in understanding this mountain belt and its differentiation into terranes, including the extent of the Avalon terrane in SE New England. We hope his colleagues, former students, and many friends will join in celebrating Father Jim's career by contributing modern work or summaries from areas of Jim's interests, tinged, perhaps, with personal recollections of this unique individual."

Writing to the editor of the Wilmington, North Carolina, *Star-News* (2007 May 11), **Pete Soderman** noted, "During the Republican debate, we watched three candidates join our current president in demonstrating a 'lack of belief' in evolution by natural selection, the most thoroughly tested theory in all of science," and commented, "To dismiss evolution, one must either ignore or discount mountains of scientific evidence gathered with great pains over the last 150 years and replace it with nothing but faith in an ancient myth."

A paper by Anila Asghar, **Jason R Wiles**, and **Brian Alters** on "Discovering international perspectives on biological evolution across religions and cultures" appeared in the *International Journal of Diversity in Organisations, Communities, and Nations* (2007; 6 [4]: 81-8). "The lingering educational controversy surrounding evolution and creationism remains one of the most prevalent issues in science education in North America," they write in their abstract.

Most science education research about this issue, when it concerns religion, involves Christian understandings of evolution. However, very little is known about the ways in which Muslim communities approach this issue. While conducting a large study in Canada, Indonesia, and Pakistan exploring Muslim students' and teachers' scientific and religious understandings in evolution, we discovered significant cultural and religious concerns surrounding the development and employment of a simple survey instrument. Herein we share a reflective account of our initial experiences while engaging in this cross-cultural research in diverse Muslim cultures and communities.

Alters is a professor of education at McGill University, where he heads the Evolution Education Research Centre; he is also a member of NCSE's board of directors. Wiles manages the Centre while com-

pleting his PhD in science education.

Melanie Wojtulewicz celebrated Darwin Day 2007 by offering a multimedia presentation on "Darwin's Galápagos through my eyes: A meditation and travelogue by a teacher of evolution" for the Center for Inquiry Community of Chicago on February 11, 2007. Until retiring, Wojtulewicz was the manager of science for the Chicago Public Schools.

PALEONTOLOGISTS DENOUNCE AIG'S CREATION "MUSEUM"

The Society of Vertebrate Paleontology issued a press release on July 17, 2007, about the misrepresentation of science in Answers in Genesis's creation "museum". "The Creation Museum's fossil exhibitions, though artistically impressive, include a vast number of scientific errors, large and small. These errors range from implying that the earth's sedimentary rocks were deposited by a single biblical Flood, to claiming that humans and dinosaurs lived alongside one another, to denouncing the reality of transitional fossils."

Kevin Padian, a paleontologist at the University of California, Berkeley, and president of NCSE's board of directors, said, "[Answers in Genesis's] Ken Ham is not recognized as a scientist or educator among experts in the fields of geology and paleontology, and his views on the interpretation of biblical texts are extremist. Visitors to his 'museum' may arrive knowing little about these sciences, but they will leave misled and intellectually deceived."

See the press release at <http://www.vertpaleo.org/news/permalinks/2007/07/17/PRESS%2DRELEASE%2D%2D%2DSVP%2Don%2Dthe%2DCreation%2DMuseum/>.



The Evolution

Andrew J Petto

Many of our readers are aware that this publication is a combination of two earlier serial publications — *NCSE Reports*, the newsletter of NCSE, and *Creation/Evolution*, originally published by the American Humanist Association and later acquired by NCSE for the publication of scientific rebuttals of creationism and for reviews of creationist and anti-creationist books. In 1996, NCSE's board of directors decided to launch a new type of publication for our members that would combine the two publications into one, and would provide for a new type of contribution — the special feature.

The board realized that focusing mainly on scientific rebuttals to creationist arguments limited NCSE's ability to carry out its missions of promoting evolution education. The old format put us in the position of *defending* against creationist claims, but, more important, allowed creationists to set the agenda. The special features would allow NCSE and its contributors to promote a better understanding of evolution (and of science in general) because they would not be limited to the issues and arguments raised by opponents of evolution. The special features material also includes items that are reprinted from other sources, whenever we think that our readers might not have ready access to these materials in their original formats or locations.

The new format allowed us also to present reviews in areas of scientific research — such as human

evolution or microbial genomes — that would bring our readers an up-to-date understanding of various fields related to evolution. Such contributions are specifically chosen because they represent a scientific field of study that is important to understanding evolution and not because they specifically refute a particular creationist argument.

Articles of these two new types have made up about 30% of our content over the past ten years. The new format allowed us to tap into a rich array of contributions that we had turned away for lack of an appropriate way to publish them, and, even in the early years of *RNCSE*, about 20% of our items were special features or scientific reviews.

However, *RNCSE* in 2007 is not what it was in 1997, and it has changed in ways that we did not imagine at the outset. Some of these reflect changes in communications media. In *Creation/Evolution*, it was common for anti-evolutionists to write rebuttals to our articles. In 2007, it is more common for creationists to post a comment to a blog or to a web site. Of course, our policies on rebuttals has not changed, but fewer anti-evolutionists seem to bother.

In retrospect, the history of the content of *RNCSE* is a record of the history of NCSE and the state of anti-evolutionism in North America (and a few other places around the world) over the past ten years. Some issues persist, but others seem to ebb and flow. As we review some of the highlights of the first ten years, please note that this content analysis excludes the short news briefs in the Updates section, the contents of the book reviews, and the reports of the many outstanding contributions to our mission that appear each issue in the News From the

Membership column. This analysis examines only news reports, special features, and scientific articles (see Figure 1).

WHAT'S IN *RNCSE*?

Of all the components of *RNCSE*, the one that appears most often is the special feature, provided for by the new format established by NCSE's board of directors in 1996. About 18% of all the items published in the last ten years were special features. Our earlier volumes were lower in this content than some later ones, but six of the ten volumes contained 15–19% special features.

The ten-year average for original scientific reviews — not specifically addressing or refuting an anti-evolutionist position — is about 13%. There is a bit more variation in these items than in the special features, but six of the ten volumes contained 12–18% scientific reviews. Part of the variation in the volume-by-volume averages is that there were several special issues of *RNCSE* that took on special themes. Special scientific articles often appeared in themed issues, and some special issues focused on important events — such as the release of the PBS series *Evolution* and the outcome of *Kitzmiller v Dover*.

There were, of course, still many scientific articles in the *Creation/Evolution* mold. Their main purpose was to address or refute specific claims, arguments, and objections to evolution made by creationists. These appear in Figure 1 as categories ID-Gen and Biblical to refer to the source of the original idea. ID-Gen refers to the “intelligent design” literature, including all formats. About 7% of our content dealt specifically with these claims. Slightly less (about 6%) dealt with similar claims

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of *RNCSE*: The First Ten Years

being made by biblical creationists. So overall about 13% of the content was devoted to scientific materials addressing specific claims by “intelligent design” or biblical creationists.

With the implementation of statewide science education standards administered by state school boards or departments of education, legislative action seems to have declined in importance (though a review of our Updates will show that anti-evolution legislation is a perennial issue). The action on statewide opposition to evolution has focused on these administrative units and their development, promulgation, and enforcement of state standards that include evolution. In eight of ten years, these items have made up over 10% of *RNCSE* content (see Figure 2).

We carried a similar proportion of items on evolution education (about 12%). It is important to know how teachers can — and do — implement the standards for evolution education. In addition, we read about the districts around the country where teachers and parents find opposition to their efforts to promote evolution education.

Associated with those statewide agencies are a number of grassroots and local citizens’ organizations that have formed in various states to promote evolution education in the standards. These come and go as state agencies address evolution issues periodically. The grassroots column also includes reports on or by citizens who become active in supporting evolution in response to local or regional challenges.

The dialog between science and religion is another area in which *RNCSE* has been able to explore ideas that are not anti-evolutionary. Taking up from the tradition of NCSE’s *Voices for Evolution*, these

items explore the religious traditions that support — or at least do not oppose — modern science, and evolution in particular.

Finally, we had minor, but measurable, numbers of contributions about “intelligent design” conferences around the country, about

evolution in the media (excluding the internet), textbook adoption issues, and various legal cases involving evolution. Early in the history of *RNCSE* we carried a regular column by NCSE Supporter Frank Sonleitner detailing the contemporary research that refuted

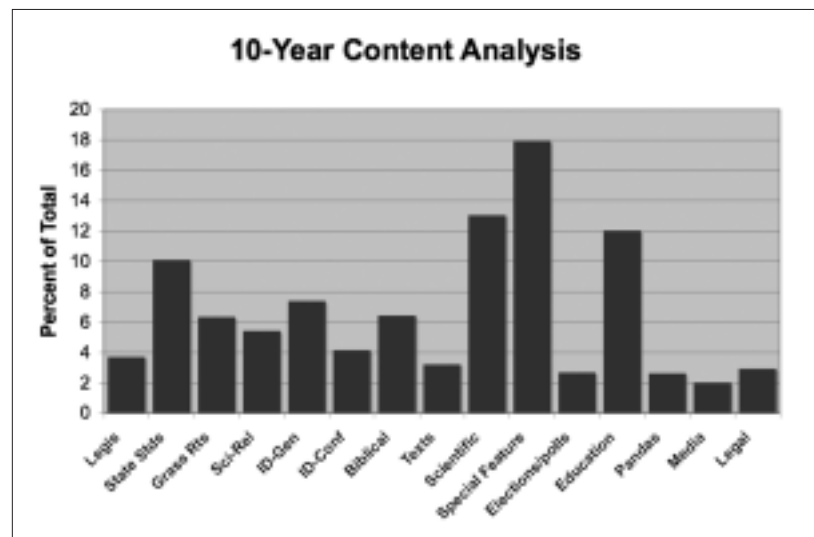


Figure 1a: A summary of the percent of items in news, features, and scientific articles in *RNCSE* from 1997 through 2006.

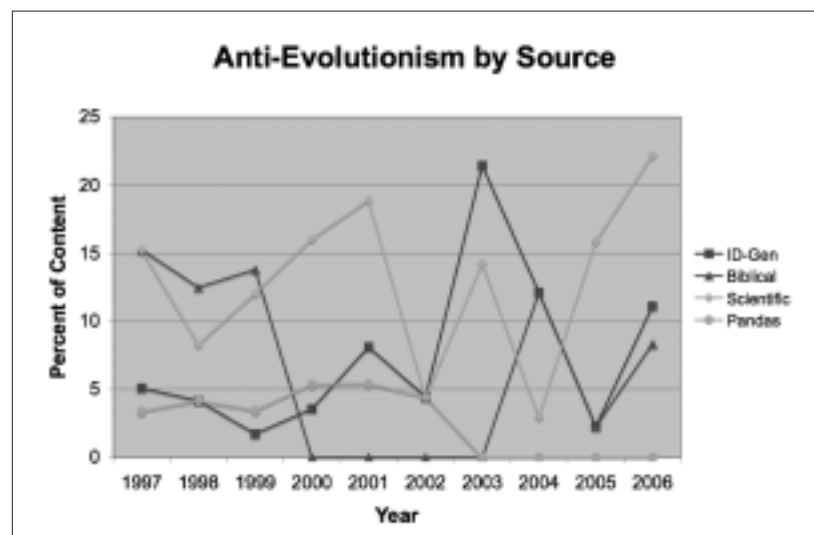


Figure 1b: Trends in the main anti-evolutionary ideas engaged in *RNCSE* over the last ten years.

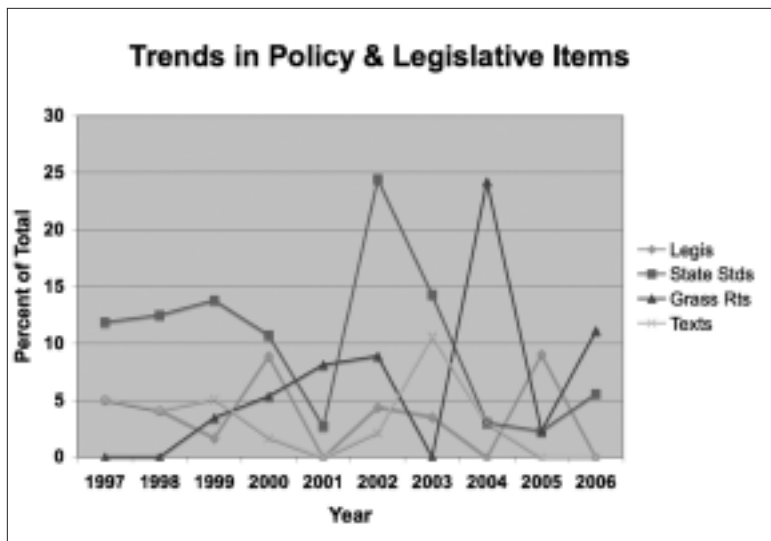


Figure 2: Trends in the content of items on legislative, school-board, and citizen-action events.

the arguments in *Of Pandas and People*. We ultimately moved Frank's review of *Pandas* — along with other resources about this book — to NCSE's website.

TRENDS IN RNCSE CONTENT

What is perhaps more interesting than the variety of articles that we publish is the way in which the content has evolved over the past ten years. For example, "intelligent design" conferences were rare in the early volumes, but "academic conferences" were a key goal of the "Wedge" strategy, and so the "intelligent design" community began organizing them. The number has been rising steadily, but our coverage has dropped off, since there is rarely anything new to report from these conferences.

However, general coverage of "intelligent design"-related issues has increased over the past ten years. Its presentation in *RNCSE* is episodic — as ID proponents trot out new materials or arguments, they are analyzed and reviewed. However, more and more of the anti-evolutionary materials seen by school boards and legislatures are from ID sources, and fewer are from old-style biblical creationists. In general, "intelligent design"-related content has been rising and biblical creationism-related content declining, but there has been an upsurge in old-style creationist material that has been addressed in the past two volumes — this is not unrelated to recent legal troubles

of Kent Hovind and Answers in Genesis, and the ongoing saga of the "Creation Museum" that AiG opened recently (see p 21).

Items related to textbook adoption, state science standards, elections and polls, and media also appear episodically (Figure 2). Textbook adoptions happen only at multi-year intervals, so stories about them do, too. Once the

state science standards are adopted, they are typically re-examined only after five or more years. The media items we covered had to do with the PBS series *Evolution* and the reactions of anti-evolutionists to the materials — including their "alternative" video productions. Legal items appear only when there is an active court case, and most of the conflicts over the past ten years — with the notable exception of *Kitzmiller* and *Selman* — were settled before they went to court.

One part of *RNCSE* that seems to change little is the Updates section. For some reason, legislators and school officials can easily be convinced that court decisions on various aspects of creationism — "balanced treatment", "equal time", "alternatives to evolution", and now "critical analysis" — somehow do not apply when the anti-evolutionism is relabeled. Perhaps the most honest of these are the old-time "creation scientists" who made it clear that the Bible was the basis for their proposals — and this does sometimes occur in the public forum even today. However, our Updates sections provide a stark confirmation of Genie Scott's observations (see p 19) that anti-evolutionism is both enduring and adaptable. It keeps popping up — in forms that we recognize as "same old, same old", but that seem to convince creationists that they are on to something new.

BROADER, WIDER, DEEPER

Finally, several other changes have allowed *RNCSE* to present new original material. Our associate editors help sort out the best papers to print. The application of their expertise in a wide variety of fields has helped us to provide high-quality features and articles thanks to their advice and guidance.

We also print more book reviews than before. We still ask our reviewers to focus on the issues of the public understanding of evolution and of the various forms and guises of anti-evolutionism. But, we can present more than just the standard "we-say-they-say" critiques of creationist publications. In the last ten years *RNCSE* has reviewed educational materials, websites, DVDs, CD-ROMs, films, and books in archaeology, geology, anthropology, geography, biochemistry, literature, and politics. All of these reflect the pervasive and multidimensional anti-evolutionism in our culture.

With the help of NCSE staff, and especially our archivists, more of *RNCSE* and *Creation/Evolution* appears on our NCSE website. We cannot post reprinted items, but much of the content of our publications is available shortly after it appears in print. We also have begun to post longer versions of some items on our website — keeping the items in print shorter and making the issues more diverse, while still providing access to an unabridged version.

Ten years ago, we had an idea about new things we could do for our readers. The board's decision to provide more and more different types of items for our membership has been exceeded. It has been an exciting ten years for us at *RNCSE*, and we anticipate more growth and more changes as we move into the future to meet NCSE's primary goal of providing our members with the best resources for promoting and defending evolution wherever you are.

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NCSE: A Decade in Retrospect

Eugenie C Scott



The year 2007 marks the tenth anniversary of the first publication of *Reports of the NCSE*, or *RNCSE*. In looking back over the last ten years, it is clear that these have been extraordinarily full years for NCSE as an organization. Our staff has grown from two full-time and two part-time staff members to the current roster of ten full-time and four part-time employees. Our annual budget has grown from \$250 000 to about \$800 000. In 1997 we had one and a half very overworked “program” people trying to monitor the creationism/evolution controversy, provide information to the public and the press, and convey information to people at the grassroots trying to cope with local and state creationist challenges to evolution education. Much of the time our activities required triage: with such a small staff, we had to choose which “flare-ups” we could spend time on; we were often frustrated that there were simply not enough hours in the day to provide sufficient assistance to some of our callers.

Because we now have more staff, we have much less anguish over triage. Moreover, as NCSE staff increased, staff has become much more diversified. Scientists still comprise the backbone of NCSE’s

program staff, but we now also have a philosopher of science, a historian of science, a theologian, and a former classroom teacher — all areas of relevance to our organizational mission. Our program staff is also highly qualified, holding among them five PhDs (two in anthropology, two in biology, and one in theology), and five master’s degrees (one each in archaeology, education, geography, library science, and philosophy). Thus we have a wide range of expertise to draw from when requests for information arrive; as has always been the case, our staff makes NCSE the effective organization it is.

Yes, we have grown, but we needed to: the creationism/evolution controversy has become more complicated since 1997. It was during the mid- to late-1990s that “intelligent design” creationism truly hit its stride, although of course NCSE had been monitoring it for the previous decade. In 1996, Michael Behe published *Darwin’s Black Box*, and in 1998, William Dembski published *The Design Inference*. Most importantly, in 1996, the Discovery Institute announced the opening of its ID-promoting center, the Center for Renewal of Science and Culture (later renamed the Center for Science and Culture). As the Discovery Institute became more active in the late 1990s, NCSE’s workload increased. I and other staff published analyses of “intelli-

gent design” arguments, and we began advising on local controversies where school boards or citizens were seeking to have “intelligent design” taught in public schools. At the same time, of course, the traditional young-earth creationists did not go away, but in fact expanded, as Answers in Genesis opened its national headquarters in northern Kentucky and even “Dr Dino” — the notorious Kent Hovind of Pensacola, Florida — expanded his popular creation science ministry.

NCSE participated in all of the large (and a lot of the small) creationism/evolution conflicts of the decade: the 1996–97 struggle in Kentucky to keep Answers in Genesis from building its creation museum next to Big Bone Lick State Park; the so-called Santorum amendment and its fallout; textbook adoptions in Texas in 2003 — the list goes on and on. Some of them, like the struggle in Darby, Montana, to keep “intelligent design” out of the science class, or the Kansas “Evolution Wars I” and “Evolution Wars II”, made the national papers; most of the controversies received local coverage at best and were well off the radar of the national press. You never heard of many other controversies we monitored and helped to resolve — because these were solved behind the scenes with little publicity, sometimes not even local newspaper coverage.

Eugenie C Scott is executive director of NCSE.

Much of NCSE's time in the last decade was spent coping with creationist pressure on state science education standards. The science education standards movement, begun in the early 1990s, has had a revolutionary effect on the science curriculum in the United States. Whereas previously each individual school district was largely in charge of its own science curriculum, now statewide standards shape instruction in all districts. The *National Science Education Standards* (NSES), produced by the National Academy of Sciences, although only advisory, has had a huge influence on the writing of science standards in the individual states. Because the NSES included evolution, and because in most states the standards were written by education professionals, evolution was included in the standards of almost all the states — at least in the first drafts.

Evolution did not always stay in later drafts, however, because creationists protested its inclusion, and political pressure on education is a fact of life in the US. It is a tribute to NCSE and its allies on the state and local level that creationists rarely succeeded in compromising science standards. Conflicts arose in almost every state, the noisiest ones being Kansas, Ohio, and Alabama. But NCSE members and other citizens also worked to keep creationism out of, and evolution in, the standards in Arizona, New Mexico, Texas, Minnesota, Nebraska, Michigan, Wisconsin, Pennsylvania, Georgia, North Carolina, Virginia, West Virginia — it is hard to remember them all.

The No Child Left Behind Act, the federal education bill signed into law in 2002, requires states to test students at regular intervals, with tests based upon the state's science standards. If evolution is in the standards, it will be on the test; if it is going to be on the tests, it will be taught. After 2002, pressure on standards developers increased even more as creationists lobbied them either to omit evolution or to include some form of creationism. When scientists and others, assisted by NCSE, fought these efforts, the creationists' fallback position was usually to opt for watering

down the teaching of evolution by presenting it as something that needed to be "critically examined" — creationist-speak for "criticize". This strategy was apparent in both Kansas and Ohio, and in several other places that did not receive as much national publicity. As long as high-stakes testing is the norm in science education, we can anticipate fights over evolution in states' science education standards.

During the decade, NCSE participated as advisors in the legal challenges to the teaching of evolution, including *Freiler v Tangipahoa*, *LeVake v Independent School District 656*, *Selman v Cobb County*, and *Kitzmiller v Dover*. It was for the *Freiler* case, in fact, that NCSE wrote its first *amicus curiae* brief; we have written (and ghost-written) several more since. But even though our assistance is frequently sought by legal teams defending evolution education, for NCSE legal redress is always the absolutely last recourse and to be avoided if at all possible. Lawsuits are expensive, exhausting, time-consuming, and distracting, and they tend to be very disruptive of small communities. Our first goal is to try to solve problems behind the scenes, when people are more likely to compromise. But sometimes a school board or other decision-maker is simply recalcitrant — the Dover school board comes to mind — and there is no recourse but to sue. Our side has prevailed in all cases, but the courtroom is always the last resort.

NCSE staff is proud to have promoted evolution education by assisting a dozen or more scientific or education associations write statements on the teaching of evolution — and the number of entries in our *Voices for Evolution* compilation almost doubled in the decade. We also assisted in 1998 and 1999 in the writing of the National Academy of Sciences's

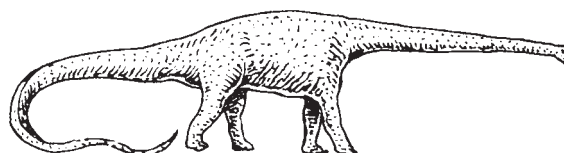
Teaching about Evolution and the Nature of Science and the second edition of *Science and Creationism*. We also advised on the NOVA *Evolution* series of television programs, as well as other documentaries produced during the period.

An innovation for us during this decade was NCSE's first member excursion: a trip to the Galápagos Islands in 1998. This was followed by our first Grand Canyon excursion in 1999, led by NCSE's great good friend Wilfred Elders. We have had other Grand Canyon trips in 2002, 2003, 2005, 2006, and 2007, using NCSE's own "Gish" — geologist Alan Gishlick, NCSE's first postdoctoral scholar. These adventures have proven to be very popular with members, and we will try to go every year to the Grand Canyon as long as interest exists. (The 2008 trip will be from July 30 to August 6 — mark your calendars!)

NCSE has grown in number of staff, budget, and impact. We take pride that we are sought for the "evolution side" of the argument by a variety of media; we take even more pride that we are the "first stop" for members of the public trying to cope with the creationism/evolution issue on the community or state level. We would not be able to do this without our members, and we hope that you are proud that your support has produced an effective organization that has truly made a difference for the integrity of science education over the last ten years. And NCSE promises to continue to do so for the foreseeable future — with your continuing support.

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A Visit to the New Creation “Museum”

Timothy H Heaton



There has been much publicity about the new Creation Museum built by Answers in Genesis in northern Kentucky (greater Cincinnati). My wife and I decided to pay the museum a visit as part of a family vacation. We took the tour on May 29, 2007, the day after the Grand Opening. Despite continuing construction and a few incomplete exhibits, I can only describe the museum as impressive. The phrase from Jurassic Park, “spared no expense”, kept coming to mind throughout the tour, and with all the animated dinosaurs, lush vegetation, and tropical sounds, it actually felt like a Jurassic Park!

The museum is exquisitely designed and well choreographed. Visitors are led through a long sequence of exhibits interspersed with videos — some on screens among the exhibits and some in comfortable theaters. The exhibits are ordered by the “7 C’s of History: Creation, Corruption, Catastrophe, Confusion, Christ, Cross, Consummation” (McKeever 2007) and have considerable diversity. The Dragon Theater, Special Effects Theater, and Stargazers’ Planetarium are not part of the exhibit sequence and can be visited for scheduled presentations. The Special Effects Theater features vibrating chairs and splashes of water — during a presentation of Noah’s Flood, of course.

The exotic feel of the museum extends well beyond the exhibits and theaters. Noah’s Café has the sounds and décor of a jungle and overlooks the lake outside, which has fountains and a variety of interesting bridges. The bookstore features a dragon theme. There are diverse activities and special exhibits for children. Visitors are photographed on their way into the museum and offered computerized prints with dinosaur backgrounds on their way out. The museum is full of helpful staff members wearing safari vests that read “Prepare to Believe”. With a touch of humor,

exhibits still under construction are labeled with signs that say “This Space is Still Evolving!” Photographs of the museum and its exhibits are available on the Web (AiG 2007; Lynn 2007), but hardly do it justice. The museum is well worth a half-day visit.

What is the message and presentation style of the Creation Museum? This is where things get interesting. First of all, Creation is only one of the “7 C’s” presented in the museum. They all get extensive coverage, though Creation Week and Noah’s Flood take center stage. The crowning event of the main tour is the Last Adam Theater where the gory details of Jesus’s crucifixion are vividly portrayed — all to offset the sin committed in the Garden of Eden by Adam and Eve presented earlier. Visitors are encouraged to discuss this Christian message with trained staff members as they exit the theater. Perhaps a more appropriate name would be the Christian Museum.

WHICH CREATIONISM?

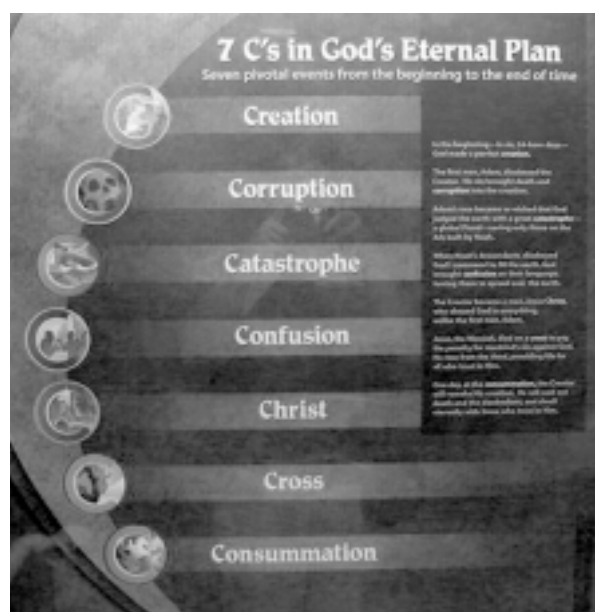
As a close follower of young-earth creationism, I was curious about many subtle aspects of the presentation. Most observers are hardly aware of the striking conflicts among creationists, both in terms of their beliefs and their presentation styles. The Creation Museum is the brainchild of Ken Ham, founder and president of Answers in Genesis USA and author of such books as *The Lie: Evolution* and *The Great Dinosaur Mystery Solved* (Ham 1987, 2000). Ham has a radio program called *Answers with Ken Ham* devoted to mocking evolution and “millions of years” with simplistic logic and innuendo — blaming these beliefs for social ills such as racism, drugs, and pornography. At first I expected the tone of the museum to fully reflect Ham’s negative propaganda style.

However, I was pleased to learn that Kurt Wise — a less propaganda-oriented creationist — was hired as a scientific consultant for the museum and played a major role in designing the exhibits. Kurt Wise and I were both graduate students under Stephen Jay Gould, and we have remained friends over the years despite our different perspectives. Richard Dawkins

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(2001) singled Wise out as “an honest creationist,” willing to admit when scientific evidence does not weigh in his favor. Wise despises evolution bashing and avoids most aspects of apologetics. His books (Wise 2002, Wise and Richardson 2004) simply lay out the Christian story and seek to build historical models that incorporate both scriptural and scientific data. Wise shuns the limelight that Ham thrives in. The common thread that links Ham and Wise is an absolute belief in biblical accuracy and authority. For example, both accept the Genesis account of animals’ and humans’ being created on Day Six of creation week, so both have concluded that dinosaurs and humans co-existed on earth — a conclusion prominently displayed throughout the Creation Museum. But beyond this biblical worldview they have little in common.

Kurt Wise’s contribution to the museum is easy to recognize. A major theme of the exhibits is introduced in the Dinosaur Dig Site diorama near the



The 7 C's — the main organizing theme of the Creation Museum

beginning of the tour. Two paleontologists are excavating together as colleagues, and each explains how his “starting point” determines his interpretation of the fossils. One begins with “Human Reason” and believes in long ages of fossil deposition; the other begins with “God’s Word” and believes the fossils formed quickly in Noah’s Flood. The two perspectives are presented as equals with no test for evaluating them (not yet, at least). One observer commented: “Here I was very surprised. The museum, so far, does not seem as militant as I was expecting. This exhibit does not say that creationism is the correct choice (where, obviously, it must be — this is the Creation Museum), but instead seems to be trying to only allow creationism to be equal to evolution” (Lynn 2007). This respectful contrast continues in a series of exhibits on fossilization and the history of life. For example, a diagram of the “Evolution Tree” shows common ancestry for all living things, whereas the

“Creation Orchard” shows diversification within a number of separately-created “kinds”. The contrast between the old-earth/evolution and young-earth/creationist viewpoints continues, in various forms, through all the science-oriented exhibits. Creationism is thereby presented as a legitimate alternative science rather than a non-science or anti-science perspective. This represents a simple but powerful harmony for those trying to reconcile Christian doctrine with science.

What likely escapes even the most sympathetic visitors is the modernness of the creationist theories being presented in the museum. Elsewhere I have summarized the latest historical modeling by young-earth creationists (Heaton 2007). The museum presents no history of creationist thinking — only the latest conclusions of prominent young-earth model builders. For example, the old notion of special creation of species is never mentioned anywhere in the museum. Ironically, while creationists tend to disparage Charles Darwin, they have fully accepted the primary conclusion of his *Origin of Species*: that similar species are related and have a common ancestor. Modern creationists simply put limits on how far evolution can go in a young-earth timeframe. This allows them to accept the undeniable evidence for microevolution while dismissing macroevolution. An entire creationist society (the Baraminology Study Group) has emerged to work out the boundaries between the Genesis “kinds” (baramins), but these creationists and their efforts are not mentioned at the museum (see *RNCSE* 2006 Jul/Aug; 26 [4] for several articles on “baraminology”). Only a general outline of their perspective is illustrated.

Other modern efforts by creationists exhibited in the museum include Catastrophic Plate Tectonics, the rapid formation of coal, the post-Flood ice age, and the carving of the Grand Canyon by the catastrophic draining of post-Flood lakes. Once again the theorists and the history of their research are not covered, but only a general outline of their conclusions. I was disappointed that the pros and cons of these models are not developed in the museum as they are (to some degree) in the creationist literature (see Wise 2002). I got the impression that the scientific aspects were being downplayed compared to the larger Christian story. However, Wise informed me of delays in several scientific videos that are yet to come on line, so this part of the museum may be expanded. One video currently online includes an interview with creationist Michael Oard discussing his modeling of the post-Flood ice age. The museum fails to acknowledge that Oard is an ardent critic of the Catastrophic Plate Tectonics model, exhibited just a few feet away. Creationism is presented as standardized doctrine worthy of uniform acceptance throughout the museum, while in reality this is hardly so. Creationists hold radically divergent views on basic factual issues, such as which rock layers were deposited by Noah’s Flood.

BALANCED TREATMENT?

Are the scientific merits of creationism and evolution presented fairly in the museum? This is perhaps the most important but also the most complicated ques-

tion to answer. Science and its underlying assumptions can be addressed at many levels. At the most basic philosophical level, science makes assumptions that deserve questioning, and supernatural intervention is within the scope of philosophical consideration. But the exhibits of the Creation Museum are not aimed at science's philosophical assumptions but at its empirical successes. The comparative results of "Human Reason" and "God's Word" presented in the museum in no way meet the same scientific standards. Young-earth creation models are a hodge-podge of religious and scientific components judged mainly by scripture. The model presented in the museum includes familiar scientific elements such as microevolution, plate tectonics, and an ice age (not mentioned in the Bible, but not contradicting it), while other equally well-established scientific conclusions such as the Big Bang, the antiquity of the earth, and the close relationship between humans and apes are rejected simply because they cannot be harmonized with a literal reading of Genesis. This is a biblical worldview with a few scientific elements thrown in for show. The creation model presented in the museum represents a reconciliation that holds true to the Bible, but this does not mean that the fit is good or that the conglomeration is scientific. In the primary literature some creationists have willingly admitted the scientific drawbacks of their models (see Heaton 2007; Wise 2002), but the museum presents creationism as a fully developed, unified model that covers all the scientific and scriptural evidence. Untrained visitors will be deceived by this presentation. To be honest the museum needs to admit frankly that creationism is not scientific and that its attempts to incorporate scientific findings are meager at best.

Despite the portrayal of the creationist and evolutionary models as equal scientific alternatives throughout the museum exhibits, there are subtle suggestions that creationism holds a better fit with the data. For example, in an exhibit on coal formation, the "problem" of clay layers within the coal is mentioned, and visitors are told that the young-earth model has a simple explanation for this while the old-earth model does not. The proposed explanation for the clay is not provided, nor is the reported "problem" for the old-earth model. In reality the same explanation, such as a storm with turbid runoff, would be adequate to explain the clay in either model.

Sleight-of-hand tricks of this type are far more egregious in other museum presentations, particularly the major video productions. For an extra fee visitors can watch a show in the Stargazers' Planetarium. This show includes an excellent presentation on the scale of the universe, including many recent astronomical findings, and light-years are used as the unit of measure. The show invites the question of how light could have traveled millions of light-years if the universe is only about 6000 years old. But visitors are assured that there are several simple explanations for how light could have traveled more quickly in the past and that many astronomical features, such as spiral galaxies and near-star Jupiter-like planets, cannot be explained by old-universe theories. In reality young-earth creationists have made no meaningful progress in resolv-



Throughout the museum science (human reason) is contrasted with a literal reading of the Bible (God's Word).

ing the starlight problem, and there is little agreement on the matter. One favorite explanation (as deceptive as it is ad hoc) is that God simply created the light *en route* to earth (Wise 2002: 64–5, 87). Creationists have no explanations of their own for astronomical objects other than "God made them," and creationist astronomy lags far behind creationist biology and geology in its development.

But even these attacks on conventional science pale in comparison with the show being presented in the museum's Special Effects Theater. This show is wildly comical and entertaining. It features a star-struck mannequin named Wendy sitting on stage by a campfire, alone in a desert wilderness, contemplating whether there might be a God. Two young men dressed as angels come flying in to take Wendy on a grand tour of creation and Christian history. These angels portray the voices of "evolution" and "millions of years" as evils sent to confuse people and lead them away from truth. They tell Wendy that radiometric dates are based on "assumptions" and therefore mean nothing. In a truly offensive scene the two angels (sans halos) appear as students in the back of a classroom where the teacher is trying to explain evolution using a slide show. The angels swap their own slides for his and proceed to harass the teacher at every turn. The teacher is portrayed as a dogmatic, bumbling idiot who holds to evolution despite all the evidence against it and cannot offer a coherent explanation to save his life. Incidentally, Answers in Genesis has published and is heavily promoting a new book called *Evolution Exposed: Your Evolution Answer Book for the Classroom* (Patterson 2006). This book, which is sold in the museum, encourages high school students to interrupt and challenge their teachers if evolution or an ancient earth is taught, and it provides them with copious ammunition. The museum's special effects show appears to be a demonstration of how students are to implement this aggressive, disrespectful behavior.



The author contemplates a museum display.

It is hard to miss the schizophrenia going on at the Creation Museum in terms of its presentation style. Kurt Wise informed me that these materials were created prior to his involvement and that the museum is trying to obtain the video masters in order to edit out the offensive material. But is Ken Ham ready to give up his

attacks on evolution? By a stroke of luck we got a partial answer to this question. In our tour of the exhibits — with the most impressive animated dinosaur as a backdrop — we ran into Ken Ham himself giving a filmed interview. As we arrived he was praising Kurt Wise, telling the interviewer that the designer of the exhibits was trained at Harvard University by the eminent evolutionist Stephen Jay Gould. But the thrust of his message was that the museum is honest and balanced in its treatment of the two sides of the creationism/evolution debate and that evolution is treated fairly and respectfully. He emphasized that it is the underlying assumptions that lead a person to one side or the other. His only adversarial comments were that scientists refuse to admit their own assumptions and that several groups had opposed the opening of the museum because they were afraid to have the creation story told. But this was a far cry from the Ken Ham I have heard bashing evolution over the radio. When the interview ended I introduced myself to Ham, and my wife snapped a photo. When I mentioned that I was a friend of Kurt Wise, he seemed pleased and pointed me toward the exhibits on earth history that Wise had designed. Whether Ham will change his tune in a significant way remains to be seen.

During my tour I tried to determine what group or groups of people the museum was designed to influence. I found little that would appeal to the sentiments of non-Christians or to committed scientists. Perhaps more significantly, there is nothing that would appeal to Christians that are already committed to old-age or allegorical interpretations of Genesis. In fact the museum exhibits and videos never admit the existence of popular Christian reconciliations with science, such as theistic evolution, progressive creation, and the day-age theory. Instead the museum contrasts only the extremes of biblical literalism and atheistic science. This appears to be a deliberate device to force visitors to accept one extreme or the other. Since the vast majority of visitors is likely to lean toward creationism, this approach will probably be quite effective. The museum is definitely designed to bolster the faith of conservative Christians and lead them to believe that young-earth creationism is in perfect harmony with the facts of modern science. The museum seems especially designed to dissuade those visitors that think they can believe both in Christianity and an old earth. The evil of “compromise” is explained in a section of the exhibits called Graffiti Alley and Culture in Conflict. In these dark, dingy rooms the evils of society are blamed on the acceptance of worldly view by many Christians. One

of the statistics mentioned is that only half of Christian pastors accept “absolutes”. To clinch the blame for this compromise, a giant wrecking ball labeled “100 Million Years” is shown demolishing a church. From this gloomy corner of the museum visitors are led through a starry tunnel into a bright theater where the six literal days of creation are read from Genesis, together with vibrant video and sound.

I found it hard to leave the museum because there was so much to see and absorb. But the experience was not over because I had arranged to visit Kurt Wise, whom we met at his new post at Southern Seminary in Louisville, just a hundred miles from the museum. We spent an enjoyable evening with Kurt and his wife discussing the museum and reminiscing about our days at Harvard. When I told Kurt that Ham had lauded his credentials, he wagged his head in disapproval but explained how he hoped he had made a positive impact. He seemed a bit conflicted about the museum and his involvement with it. Kurt’s faith is so sound that he feels no need to bolster it by convincing others. He loves science and wants to find a harmony that remains true to his strict belief in scripture. But he is perfectly at ease letting others believe as they see fit. The museum was an opportunity and a frustration for him: an opportunity to put more honesty and respect into creationism, but a frustration because he had to compromise with a propaganda machine that he dislikes. Had it not been for Kurt’s stories and explanations the museum experience might have remained a puzzle, but now the museum’s schizophrenia makes perfect sense. While I remain merely a curious observer of young-earth creationism, I can only applaud Kurt’s efforts and hope his approach wins the day.

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Intelligent Design 101

James Curtsinger

Good morning, class. As you know, the local school board has decided that we must include “intelligent design” in high school biology, so let’s start with the work of Dr Michael Behe, ID’s leading scientist. Dr Behe, a professor of biochemistry, visited the U last week as a guest of the MacLaurin Institute. I spoke with him at lunch, attended his public lecture, and took notes for today’s class.

Dr Behe opened his public lecture by showing two images: a mountain range and Mount Rushmore. One had a designer; the other did not. In case anyone was uncertain which was which, Dr Behe also showed a duck, and emphasized that if it looks like a duck, and it quacks like a duck, then it is a duck. Ergo if something in biology looks designed, it is designed.

He reviewed “irreducible complexity,” the important notion that certain structures with intricately interacting parts cannot function if any part is removed. According to Dr Behe, such structures could not evolve gradually, as standard Darwinian Theory supposes; they must be the handiwork of a designer.

Well-known examples include mousetraps, the blood-clotting cascade, the vertebrate immune system and the bacterial flagellum. All of this was covered in his 1996

book, *Darwin’s Black Box*. Dr Behe spent quite a bit of time talking about reviews of his book, and his responses to reviews.

Surprisingly, he had nothing to say about new developments in ID. Surely this revolutionary approach to biology has produced important scientific insights in the last nine years. Let’s use the Web to discover what they are.

Use Google to find “Entrez PubMed”, which will take you to a database of 15 million peer-reviewed publications in the primary scientific literature. The site, maintained by the National Library of Medicine, allows users to enter a search term and retrieve references to relevant publications.

For instance, enter “natural selection” in the search box and click “go”; about 14 000 references will be found. “Mutation” gets 40 000. “Speciation” gets 5000. “Human origins” gets 22 000. “Behe intelligent design” gets ... 0.

Not one publication in PubMed contains the terms “Behe”, “intelligent”, and “design”. The same holds for “Behe irreducible complexity”. A less restrictive search for “intelligent design” finds 400 papers, but many are not relevant because the words are common in other contexts.

To get more useful information, enter “intelligent design” in quotation marks, which searches for the two words together. When I searched last week, this produced 25 references, of which 13 were irrelevant to this discussion, five were news articles, six were critical of ID, and one was a historical review. “Irreducible complexity” in quotes gets five hits, one irrelevant and the others critical of ID.

Exact numbers change daily as new publications are added to the database, but the pattern is clear. Where are the scientific papers supporting ID?

Perhaps Dr Behe publishes

research papers that support “intelligent design” without using those terms. Searching PubMed for “Behe MJ” and sorting the results by date, you will find 11 publications since 1992, when the good professor converted to his new ideology. Several are just letters to the editor. The most recent (Behe and Snoke 2004, 2005) suggest that certain events in molecular evolution have low probability of occurrence.

This falls far short of the claim that a designer must have intervened, but what the heck, let’s put all 11 in the ID column. Under these rather generous assumptions, ID’s leading light has produced fewer than a dozen peer-reviewed papers for the cause in 15 years, none of which explicitly mentions ID. That number is substantially less than PubMed finds for “voodoo” (78), and pales in comparison with “diaper rash” (475). Perhaps when the number of supporting publications rises to the level of “horse feces” (929) the professional community will grant ID some respect.

Cynics will suggest that ID is intentionally excluded from the peer-reviewed literature. It is possible; the system strives for objectivity, but any human endeavor is potentially subject to bias. This argument fails, however, when we consider that other revolutionary ideas have successfully crashed the party. Plate tectonics, major meteoritic impacts, and the bacterial origin of mitochondria are important ideas that were initially regarded with skepticism but are now accepted by the professional community.

Non-Darwinian molecular evolution, so-called “neutral theory,” was also despised when it was first proposed in the late 1960s, but within a decade it became a standard part of the literature. The

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PRIZE ESSAYS ON EVOLUTION AND MEDICINE

A May 14, 2007, press release from the Alliance for Science — a non-profit organization which seeks “to heighten public understanding and support for science and to preserve the distinctions between science and religion in the public sphere” — announced the winner of a national essay contest for high school students on the topic: Why would I want my doctor to have studied evolution?

Gregory Simonian, a sophomore in Los Angeles, won the grand prize for his essay, which cites disease tracking and antibiotic resistance as two important contributions of evolutionary biology to medicine. He received a \$300 cash prize and a subscription to *Seed* magazine. His teacher also received a prize.

Merve Fejzula, a senior in Englewood, New Jersey, won second place for her entertaining essay about visiting her doctor’s own waiting room and considering the role of evolution there. Third place went to Shobha Topgi, a junior in Palatine, Illinois, and fourth place went to Linda Zhou, a ninth-grader in River Edge, New Jersey.

The director of the Alliance for Science essay contest, Dick Lessard, said, “I hope this contest has helped students see that evolutionary science is not a matter of personal philosophy or worldview. It’s hard, evidence-based science that directly affects our lives individually, as well as having major implications for public policy.”

The winning essays have been posted at the Alliance for Science website: <http://www.allianceforscience.org/essay_winners.html>.

historical evidence suggests that scientists can be persuaded to new views, given appropriate evidence. The primary literature is particular, but not rigid.

While you are at the PubMed web site, try searching for “bacterial flagella secretion”. One of the resulting papers, by SI Aizawa (2001), reports that some nasty bacteria possess a molecular pump, called a type III secretion system, or TTSS, that injects toxins across cell membranes.

Much to Dr Behe’s distress, the TTSS is a subset of the bacterial flagellum. That’s right, a part of the supposedly irreducible bacterial “outboard motor” has a another biological function! When I asked Dr Behe about this at lunch he got a bit testy, but acknowledged that the claim is correct (I have witnesses). He added that the bacterial flagellum is still irreducibly complex in the sense that the subset does not function as a flagellum.

His response might seem like a minor concession, but is very significant. The old meaning of irreducible complexity was, “It doesn’t have *any* function when a part is removed.” Evidently, the new meaning of irreducible complexity is “It doesn’t have *the same* function when a part is removed.”

The new definition renders irreducible complexity irrelevant to evolution, because complex adap-

tations are widely thought to have evolved through natural selection co-opting existing structures for new functions, in opportunistic fashion.

The story is incomplete, but it is a perfectly reasonable hypothesis that the bacterial flagellum evolved first as a secretory system, and later was adapted by natural selection for locomotion.

This scenario for gradual evolution of a complex molecular machine is bolstered by recent reports that some bacterial flagella do, in fact, have a secretory function (and now you know how to find those papers). The irreducibly complex teeters on the verge of reduction. None of these difficulties were mentioned in the public lecture.

It seems that a new image should be added to Dr Behe’s public presentation, one that represents the scientific status of intelligent design: a duck on its back, feet in the air, wings splayed. If it looks like a dead duck, and it smells like a dead duck, it is a dead duck.

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*Ceratopsid dinosaur wearing a saddle at Answers in Genesis's Creation Museum.
Photograph: Daniel Phelps.*

Visit Your Local Natural History Museum

With all the attention being generated by the Answers in Genesis Creation “Museum”, we thought that our readers might like to know what science-based museums they could visit at home or on vacation. The Natural History Caucus of the Special Libraries Association has a list of over 350 venues that celebrate the history and diversity of life on earth. To save space, we have chosen a selection. You can see the complete list on-line at <http://www.lib.washington.edu/sla/natmus.html#NAM>.

Alaska

Alaska Botanical Garden, Anchorage
University of Alaska Museum, Fairbanks

Alabama

Anniston Museum of Natural History
Birmingham Botanical Gardens
Red Mountain Museum, Birmingham

Arizona

Arboretum at Flagstaff
Colorado Plateau Museum of
Arthropod Biodiversity, Flagstaff

California

Natural History Museum, Arcata
California Living Museum, Bakersfield
Chula Vista Nature Center
Scripps Institution of Oceanography
Collections, La Jolla
Natural History Museum of Los Angeles
County
Maturango Museum, Ridgecrest
San Diego Natural History Museum
California Academy of Sciences,
San Francisco
Santa Barbara Museum
Santa Cruz City Museum
Lindsay Wildlife Museum, Walnut Creek
Hi-Desert Nature Museum, Yucca Valley

Colorado

John May Natural History Museum,
Colorado Springs
Denver Museum of Nature and Science
Rocky Mountain Dinosaur Resource Center,
Woodland Park

Connecticut

Peabody Museum of Natural History,
New Haven
Stamford Museum & Nature Center
Connecticut State Museum of Natural
History, Storrs

Delaware

Delaware Museum of Natural History,
Wilmington

District of Columbia

National Museum of Natural History

Florida

Allyn Museum of Entomology, Gainesville
Bailey-Matthews Shell Museum,
Sanibel Island

Georgia

Fernbank Museum of Natural History,
Atlanta

Hawai'i

Bernice P Bishop Museum, Honolulu
Honolulu Community College
Dinosaur Exhibit

Iowa

Brenton Arboretum, Dallas Center

Idaho

Idaho Botanical Garden, Boise

Orma J Smith Museum of Natural History,
Caldwell

Illinois

Illinois Natural History Survey, Champaign
Field Museum, Chicago
Peggy Notebaert Nature Museum, Chicago
Jurica Nature Museum, Lisle
Burpee Museum of Natural History, Rockford
Illinois State Museum, Springfield
Museum of Natural History,
Urbana-Champaign

Kansas

Sternberg Museum of Natural History, Hays
Fick Fossil Museum, Oakley

Louisiana

Louisiana Museum of Natural History,
Baton Rouge
Lafayette Natural History Museum

Massachusetts

Natural History Museum, Amherst
Cape Cod Museum, Brewster
EcoTarium, Worcester

Maryland

Cylburn Arboretum, Baltimore
National Aquarium, Baltimore

Minnesota

Bell Museum of Natural History, Minneapolis
Science Museum of Minesota, St Paul

Missouri

Wilbur R Enns Entomology Museum,
Columbia
Missouri Botanical Garden, St Louis

Mississippi

Scott Marine Education Center,
Biloxi
Mississippi Entomological Museum,
Mississippi State

Nebraska

Botanical Garden and Arboretum, Lincoln
Trailside Museum, Crawford

North Carolina

Charlotte Nature Museum
North Carolina Museum of Natural Sciences,
Raleigh

North Dakota

Northern Prairie Herbarium, Jamestown

New Hampshire

Little Nature Museum, Contoocook

New Jersey

Rutgers University, New Brunswick

New Mexico

Ruth Hall Museum of Paleontology, Abiquiu
Museum of Southwestern Biology,
Albuquerque
Natural History Museum, Portales

New York

American Museum of Natural History,
New York City

Buffalo Museum of Science
Vanderbilt Museum, Centerport

Ohio

Cincinnati Museum Center Museum of
Natural History & Science
Cleveland Museum of Natural History

Oklahoma

Oklahoma Museum of Natural History,
Norman

Oregon

Pacific Northwest Museum, Ashland
High Desert Museum, Bend

Pennsylvania

Academy of Natural Sciences, Philadelphia
Philadelphia Insectarium
Carnegie Museum, Pittsburgh
Wagner Free Institute, Philadelphia

Rhode Island

Museum of Natural History & Cormack
Planetarium, Providence
Rhode Island Natural History Survey,
Providence

South Carolina

South Carolina State Museum, Columbia
Collection of North American Lepidoptera,
Greenville

Tennessee

Frank H McClung Museum, Knoxville

Texas

Texas Natural History Collections, Austin
Dallas Museum of Natural History
Houston Museum of Natural Science
Heard Natural Science Museum and
Wildlife Sanctuary, McKinney

Utah

Natural History Museum of Southern Utah,
Cedar City
Utah Museum of Natural History,
Salt Lake City

Virginia

Geological Sciences Museum, Blacksburg
Virginia Museum of Natural History,
Martinsville

Vermont

Nature Museum at Grafton
Fairbanks Museum, St Johnsbury

Washington

C Conner Museum, Pullman
Burke Museum of Natural History and
Culture, Seattle
JR Slater Museum, Tacoma

Wisconsin

Milwaukee Public Museum

Wyoming

Draper Museum of Natural History, Cody
Geological Museum, Laramie
Wyoming Dinosaur Center, Thermopolis

"INTELLIGENT DESIGN" ON TRIAL

The decision in *Kitzmiller v Dover* (400 F.Supp.2d 707 [M.D. Pa. 2005]) was a welcome confirmation of what members of NCSE already knew: that "intelligent design" (so-called) "is not science and cannot be adjudged a valid, accepted scientific theory as it has failed to publish in peer-reviewed journals, engage in research and testing, and gain acceptance in the scientific community" and that it "is nothing less than the progeny of creationism." Judge Jones was on solid ground in his decision, since at the trial, with the aid of a stellar team of expert witnesses — including no fewer than three members of NCSE's board of directors — aiding the plaintiffs, "intelligent design" was revealed to be riddled with scientific error and entangled, historically and conceptually, with creationism. And there is no shortage of books available these days making the same points, in a variety of ways and from a variety of perspectives. The following books are available through the NCSE web site: <www.ncseweb.org/bookstore.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 HISTORIANS

Creationism's Trojan Horse: The Wedge of Intelligent Design
by Barbara Forrest and Paul R Gross

The definitive exposé of the "intelligent design" movement's so-called Wedge strategy, *Creationism's Trojan Horse* — in Steven Pinker's words — "documents the disturbing movement to sneak religious dogma back into science education, driven by the vague fear that Americans can't handle the truth. Educators, scientists, and politicians would do well to understand this movement and its tactics, and this book is a superb and timely analysis." The paperback edition contains a new chapter on *Kitzmiller v Dover*, in which Forrest, a member of NCSE's board of directors, testified for the plaintiffs, as well as a foreword from Americans United for Separation of Church and State's Barry Lynn.

Species of Origins: America's Search for a Creation Story
by Karl W Giberson and Donald A Yerxa

Intended as part as a sequel to Ronald L Numbers's seminal work, *Species of Origins* impartially surveys the full spectrum of the creationism/evolution debate, from young-earth creationism and "intel-

ligent design" through theistic evolution to atheistic evolution. Michael Ruse describes it as "a simply invaluable primer on the subject that should be made compulsory reading for all who have ever thought on science-and-religion ... I can think of no better place to start into the debate about origins — creationism or evolution — than with this book." The authors are professors — Giberson of physics and Yerxa of history — at Eastern Nazarene University.

The Creationists: From Scientific Creationism to Intelligent Design
by Ronald L Numbers
Republished in 2006 with additional chapters on the global spread of creationism and the advent of the "intelligent design" movement, Ronald L Numbers's monumental study remains the pre-eminent work on the history of creationism, respected by people on both sides of the dispute. "For those interested in the background of the modern revival of creationism, whether evolutionists or creationists," wrote Henry M Morris, "this book is a rich mine of information and historical insights." And Elliott Sober comments, "Those who wish to understand current opposition to Darwinism, and the larger question of how science and religion interact, must read this book."

Where Darwin Meets the Bible: Creationists and Evolutionists in America
by Larry A Witham

In *Where Darwin Meets the Bible*, Larry Witham provides a lively and anecdotal account of the contemporary creationist/evolution controversy, based on his wide reading and personal interviews with many of the principal players on both the anti-evolution and the evolution sides. Reviewing the book for *Science*, Kenneth R Miller praised Witham for weaving "the isolated elements of the conflict into a fabric that connects the flow of ideas, events, and politics. Any scientist tempted to believe that the major figures in the anti-evolution movement are half-hearted, insincere, or simply opportunistic in their assault against mainstream science would do well to read this book."

THE CRITICS SINGLY

Tower of Babel
by Robert Pennock

The earliest comprehensive treatment of the "intelligent design" movement, *Tower of Babel* was praised by Frederick Crews in *The New York Review of Books* as "... comprehensive and consistently rational ... the best book opposing creationism in all of its guises" and

by Evan B Hazard in *Choice* as “[e]ssential reading for all social and natural scientists (especially secondary and college teachers), and also concerned pastors, seminarians, and seminary professors.” Pennock, a member of NCSE, is Professor of Philosophy at Michigan State University and editor of *Intelligent Design Creationism and its Critics*; he testified for the plaintiffs in *Kitzmiller v Dover*.

Unintelligent Design

by Mark Perakh

In *Unintelligent Design*, Mark Perakh offers incisive critiques of the work of “intelligent design” advocates William Dembski, Michael Behe, and Phillip Johnson (whom he describes as a “militant dilettante”), as well as animadversions on “primitive” (or literalist) creationists and thoughts about scientific method. Reviewing *Unintelligent Design* in *RNCSE*, Jason Rosenhouse writes, “I have been a consumer of intelligent-design (ID) literature for several years now, but I don’t think I fully appreciated the sheer extent of its awfulness before reading Mark Perakh’s *Unintelligent Design*. Perakh dissects the arguments of the leading ID proponents with unusual care and thoroughness.”

Doubting Darwin? Creationist Designs on Evolution

by Sahotra Sarkar

Sahotra Sarkar, Professor of Integrative Biology and of Philosophy at the University of Texas at Austin, offers a powerfully argued arraignment of the scientific bankruptcy of “intelligent design” creationism. William Wimsatt writes, “Sarkar’s scientific expositions and dissections of Dembski’s specious arguments and Behe’s lack of imagination are clear, surgical, and authoritative. For those who would fear a return to the middle ages, this is the best critique of ID now available.” And Jeffrey Shallit comments, “Part history, part science, and part philosophy, *Doubting Darwin?* is a deft critique of the new creationism. Sahotra Sarkar hits all the main points with economy and the broad knowledge of a scientist-philosopher.”

God, the Devil, and Darwin

by Niall Shanks

In *God, the Devil, and Darwin*, Niall Shanks provides a philosophically acute and politically engaged critique of “intelligent design” which Richard Dawkins describes, in his foreword, as “a shrewd broadside in what will, I fear, be a lengthy campaign.” After reviewing and debunking the leading scientific and philosophical claims of “intelligent design,” Shanks wryly concludes, “Intelligent design advocates have not merely failed to offer extraordinary evidence but indeed have failed to offer even humdrum evidence to support their case,” and describes “intelligent design” as “old medieval theological wine in new biochemical and cosmological bottles.” Shanks is Professor of Philosophy at Wichita State University.

THE CRITICS EN MASSE

The Panda’s Black Box: Opening up the Intelligent Design Controversy

edited by Nathaniel C Comfort

In his introductory essay to *The Panda’s Black Box*, the editor writes, “By all means, let us teach the controversy — but not in biology class. We need the tools of the humanities to peel away the rhetoric and the politics, to see what the controversy is really about. We must open the panda’s black box.” Accordingly, Michael Ruse discusses the argument from design and Edward J Larson rehearses the legal history of the creationism/evolution controversy, while Scott F Gilbert explains “Why Biologists Are Loath to ‘Teach the Controversy’”; Jane Maienschein reflects on “Untangling Debates about Science and Religion”; and Robert Maxwell Young diagnoses “intelligent design” as “A Symptom of Metaphysical Malaise”.

Intelligent Design Creationism and Its Critics

edited by Robert T Pennock

The publisher writes that Pennock’s anthology on intelligent design creationism (IDC) “contains articles previously published in specialized, hard-to-find journals, as well as new contributions. Each

section contains introductory background information, articles by influential creationists and their critics, and in some cases responses by the creationists. The discussions cover IDC as a political movement, IDC’s philosophical attack on evolution, the theological debate over the apparent conflict between evolution and the Bible, IDC’s scientific claims, and philosopher Alvin Plantinga’s critique of naturalism and evolution. The book concludes with Pennock’s ‘Why Creationism Should Not Be Taught in the Public Schools.’”

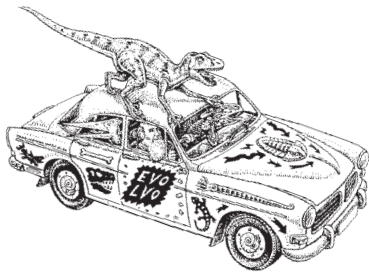
Scientists Confront Intelligent Design and Creationism

edited by Andrew J Petto and Laurie R Godfrey

A spectacular new anthology featuring essays about creationism — and its latest incarnation, “intelligent design” — by Ronald L Numbers, NCSE’s Eugenie C Scott, John R Cole, Victor J Stenger, Antonio Lazcano, Kevin Padian and Kenneth D Angielczyk, Robert Dorit, NCSE’s Wesley R Elsberry, C Loring Brace, Robert T Pennock, Norman A Johnson, J Michael Plavcan, Alice Beck Kehoe, and the editors, Andrew J Petto and Laurie R Godfrey; Cole, Padian, and Petto are all members of NCSE’s board of directors. *Scientists Confront Intelligent Design and Creationism* is a worthy successor to Godfrey’s previous collection, *Scientists Confront Creationism*, published in 1984.

Why Intelligent Design Fails

edited by Matt Young and Taner Edis, In *Why Intelligent Design Fails*, a team of scientists — Taner Edis, Matt Young, Gert Korthof, David Ussery, Ian Musgrave, Alan Gishlick, Niall Shanks, Istvan Karsai, Gary Hurd, Jeffrey Shallit, Wesley Elsberry, Mark Perakh, and Victor Stenger — call on their expertise in physics, biology, computer science, and archaeology to examine “intelligent design”. NCSE President Kevin Padian describes *Why Intelligent Design Fails* as “[a] terrific book that explores, fairly and openly, whether proponents of ID have any scientifically valid gadgets in their toolbox at all. ... Accessibly written throughout and an invaluable aid to teachers and scientists.”



NCSE on the Road

A CALENDAR OF SPECIAL EVENTS, PRESENTATIONS, AND LECTURES

DATE October 8, 2007
CITY Athens OH
PRESENTER Eugenie C Scott
TITLE From Scopes to the Creation Museum:
 The Resilience of Antievolutionism
EVENT Frontiers in Science lecture series
TIME 7:30 PM
LOCATION Templeton-Blackburn Auditorium
 Ohio University
CONTACT Gretchen L Stephens, stephens@ohio.edu

DATE November 9, 2007
CITY New York NY
PRESENTER Eugenie C Scott
TITLE Science Education and the Public
 Understanding of Science
EVENT Center for Inquiry-New York conference on
 religion and politics
TIME TBA
LOCATION 7 World Trade Center
CONTACT Derek C Araujo, daraujo@centerforinquiry.net

DATE October 25-27, 2007
CITY Long Beach CA
PRESENTER NCSE staff
TITLE [Booth in the exhibit hall]
EVENT California Science Education Conference
TIME While exhibit hall is open
LOCATION Long Beach Convention Center
CONTACT Carrie Sager, sager@ncseweb.org

DATE November 29 to December 1, 2007
CITY Atlanta GA
PRESENTER NCSE staff
TITLE [Booth in the exhibit hall]
EVENT NABT annual meeting
TIME While exhibit hall is open
LOCATION Hyatt Regency, Atlanta
CONTACT Carrie Sager, sager@ncseweb.org

DATE October 27, 2007
CITY Long Beach CA
PRESENTER Eugenie C Scott
TITLE Surmounting the Roadblocks to Teaching
 Evolution
EVENT California Science Education Conference
TIME 9:30 AM
LOCATION Long Beach Convention Center
CONTACT Eugenie C Scott, scott@ncseweb.org

DATE February 9, 2008
CITY Tallahassee FL
PRESENTER Eugenie C Scott
TITLE What Do Creationists Know About Darwin?
EVENT Florida State University's Darwin Day
 celebration
TIME TBA
LOCATION TBA
CONTACT Eugenie C Scott, scott@ncseweb.org

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

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Evolution in Schools: Where's Canada?

Jason R Wiles



Jason R Wiles

Theodosius Dobzhansky may not be a household name, but scientists worldwide remember him as one of the foremost geneticists of the 20th century. By science teachers, however, Dobzhansky is known primarily for his famous essay entitled "Nothing in biology makes sense except in the light of evolution" (1973), which has been quoted in myriad articles, textbooks, and science pedagogy publications for over thirty years. But although evolution is, as Dobzhansky insisted, the underlying and unifying concept of all of the life sciences, it appears that many Canadian students are not being presented with an evolution-based biology curriculum.

Recent events in the United States have brought anti-evolution efforts into the forefront of the media's coverage of science education, and it makes press in Canadian outlets as well. Canadians can be regularly heard scoffing at American debacles such as the controversy regarding the denigration of evolution in Kansas's science standards, the anti-evolution "warning stickers" only recently removed from science textbooks in school districts in Georgia and Arkansas, the legally defeated "intelligent design" (ID) policy of the Dover Area School District in Pennsylvania, and the spate of ongoing anti-evolution legislation in

several states. While it is easy to deplore such egregious anti-science activity south of the border, Canadians need to be aware that rejection of evolution, anti-evolution education efforts, and neglect of evolution in schools are problems in this country as well.

Polls have shown that the level of Canadian acceptance of evolutionary theory is about as dismally low as that of the US, with about one in two people favoring some form of creationism (according to a 1993 Angus Reid poll; see Owens 2000; Soderstrom 2000). And Canada has not been without its own evolution education debacles. In the 1990s, creationists were encouraged by the Abbotsford School District in British Columbia to present their pseudo-scientific and religious beliefs in senior science classrooms. That case eventually involved legal action by the BC Civil Liberties Association, an ultimate quashing of the practice by the Minister of Education, and national embarrassment for Abbotsford. Still, some sources report that as many as 30% of BC's science teachers remain sympathetic to creationism (Meijer 2005).

And then there is the embarrassment the Ontario Ministry of Education suffered in 2000 when headlines regarding the province's new curriculum read:

"Evolution nearly extinct in classroom: New science curriculum tries to avoid controversy" (*Ottawa Citizen*, 2000 Oct 29)

"Ontario downplays evolution education" (*Victoria Times-Colonist*, 2000 Oct 30)

"Ontario education is missing a link" (*Sudbury Star*, 2000 Nov 1)

"There's a missing link in our schools" (*Guelph Daily Mercury*, 2000 Nov 1)

"Evolution theory off-limits; Provincial curriculum shies from teaching topic to avoid controversy" (*The Windsor Star*, 2000 Oct 30)

Ontario was not the only province to have seen press regarding evolution that year. Reports from Prince Edward Island told of the Home and Schools Federation's resolution calling for the PEI Education Department to give equal time to creationism whenever evolution is discussed in schools. The response from PEI's Ministry of Education was to assure people that evolution is not part of the province's curriculum in the first place because it is "too controversial" (Anonymous 2000). Of course, in the scientific community, evolution is not controversial at all. Rather, it is fundamental.

But that is not the message portrayed by Canada's anti-evolution organizations. Yes, that's right; Canada has several creationist groups ... almost one in every province (the Maritime Provinces share the Atlantic Canada Creation Science Association), and there are others focusing on the nation as a whole. Aside from hosting websites, these organizations offer presentations in schools and invite students to attend presentations in other venues. Some of them host anti-evolution summer camps, publish very attractive anti-evolution magazines and books for children as well as adults, sponsor creation science museums, coordinate anti-evolution conferences in communities across the country, broadcast on hundreds of radio and television shows per year, write letters to editors of newspapers, and so on — all here in Canada!

What effect these creationist organizations are having on



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Canadian students remains to be seen. We at the Evolution Education Research Centre (see sidebar, p 32), housed at McGill University, are interested in studying this matter. Our efforts to do so have involved an application for funding from Canada's Social Sciences and Humanities Research Council (SSHRC) to find out whether, and if so how, the popularization of anti-evolution campaigns, namely ID, might be influencing the learning, teaching, and understanding of science in this country. The readers of *Education Canada* may recall the burst of media activity that ensued earlier this year after it was made public that the rejection letter sent by the SSHRC's granting committee cited, among other reasons for denying the grant, a lack of "justification for the assumption in the proposal that the theory of evolution, and not intelligent-design theory, was correct" — as if that were in doubt (Hoag 2006a, 2006b).

Scientists from across Canada, and indeed from around the world, have written in protest of this statement. The evidence of the occurrence of evolution is overwhelming, so much so that it is no longer debated in the scientific community. Modern biological scientists work under the model of evolution without any need to justify it in their writings, including grant applications. In the natural sciences, the occurrence of biological evolution is, and has been since the late 19th century, a given. This is evident in the position of the Academy of Science of the Royal Society of Canada (RSC), which declares:

The theory of evolution by natural selection was first clearly formulated in 1859, and for over a century it has been tested and improved by the research of many thousands of scientists: not only by biologists and geologists, but also by chemists and physicists. From deductions based on abundant data, the theory has been developed to explain the changes that have taken place in living things over much of the earth's history. In its modern

form, it remains the only explanation for the diversity of life on this planet that is acceptable to the scientific community. (RSC 1985)

This acceptance of evolution and its centrality to modern science is also very clear in the RSC's statement in response to the SSHRC committee:

Intelligent Design is a religious belief, and Evolution is the only credible scientific position that is defensible. The RSC position in support of evolution has been consistent: from a scientific point of view, the teaching of Evolution is a benchmark for legitimacy. Other theories or positions, such as Intelligent Design, are not scientific in basis or nature. (Demers 2006)

Eventually, the SSHRC also released a statement confirming the institution's support of evolutionary science in a statement that read, in part, "The theory of evolution is not in doubt. SSHRC recognizes the theory of evolution as one of the cornerstones of modern science and of our understanding of the world."

EERC still has not obtained funding for the proposed large-scale Canadian study. But there is anecdotal evidence that some Canadian students have been voicing their rejection of evolution in the classroom. Keith Wilcox teaches at a high school in Laval, Québec. In a letter to EERC asking for help in finding a speaker on evolution for his class, Wilcox reported, "Well over half of my stu-

dents reject the idea that humans have anything in common with other primates." He went on to say, "In Québec high schools, there is a compulsory general Science course in Grade 10, but that curriculum does not include evolution. I wonder whether any students are ever taught evolution in the Québec science program, at any level."

Indeed, evolution is taught in Québec, and at various levels. It appears, however, to be treated inconsistently among different schools and by different teachers. To be sure, evolution is specified in the Québec Education Program for cycle three elementary and cycle one secondary. However, in discussions with many elementary school and secondary cycle one science teachers in Québec, we at the EERC have found that many of them confess that evolution is never actually taught in their schools.

Evolution is also listed in Québec's curriculum for senior biology courses, but instead of taking the central role in the structure of these courses as it should, it is relegated to the last part of the last quarter. To add to this, relatively few students take this optional course, so it is completely understandable that Wilcox would wonder whether evolution is taught in Québec at all.

It is not only students who attempt to exert pressure on teachers to limit or avoid teaching evolution. Colleen Carter, a public school science teacher in the Montréal area, reports that she can expect to hear from parents every year when evolution comes up in her classes. These parents will call her on the phone, send letters, or

THE EVOLUTION EDUCATION RESEARCH CENTRE

The EERC opened its doors at McGill University in 2001 with four McGill professors and four Harvard professors who have expertise in anthropology, biological evolution, educational psychology, geology, molecular biology, paleontology, philosophy of science/education, and science education. In addition, the Centre currently has two full-time managers: a postdoctoral fellow from Harvard University and a PhD student in evolution education, both working on various Centre activities. The Centre's activities receive modest financial support from the federal government, McGill University, and private donations.

even come into the school to protest what is being presented in her biology courses. Parents have even proposed that their children be exempt from any sessions and material dealing with evolution or even that she include creationism in her curriculum.

As with Wilcox's classes, though, it is often the students who try to bring creationism into Carter's classroom. Some students are just sullen when the topic of evolution arises, but the ones who do want to talk about it are very vocal. According to Carter, her descriptions of the fossil record and of the mechanisms of evolution are punctuated by students saying, "That's not true!" or "You can't prove it!" One year, her students wanted to stage a "debate" evolution and creationism. Carter refused to allow this, however, because she did not want to permit anyone "to advocate religion in her science class."

This is the proper attitude for a public school science teacher to adopt. Religion is not within the realm of scientific inquiry and therefore should not be part of the science curriculum. This is quite explicit in the position statements on evolution education of over 100 scientific, educational, and religious organizations listed in the (US) National Center for Science Education's "Voices for Evolution" website (NCSE nd). One of these is the American Institute of Biological Sciences (AIBS), an umbrella organization comprising nearly 200 professional societies with a total individual membership of over 250 000 scientists and science educators. According to AIBS, "evolution is the only scientifically defensible expla-

nation for the origin of life and development of species" (AIBS 1994). This position is consistent with the aforementioned statement of the RSC's Academy of Science, which concluded, "The methodology and conclusions of scientists and 'scientific creationists' are ... incompatible, and the term 'scientific creationism' is a contradiction in terms, since it has no basis in science."

These scientific societies are in agreement with the (US) National Association of Science Teachers, the world's largest organization of professional science educators, which "strongly supports the position that evolution is a major unifying concept in science and should be included in the K-12 science education frameworks and curricula. The NSTA adds, "if evolution is not taught, students will not achieve the level of scientific literacy they need" (NSTA 2003).

Canadians would do well to acknowledge that, even though we may not see as many battles over evolution as there have been in the US, we may not be doing a much better job of teaching our students about evolution. The resulting ignorance will not serve them well. In Canada, as much as in the US, now is the time for educators to rally in defense of the teaching of evolution.

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FULLER CROSS-EXAMINED

The December 2006 issue (36 [6]) of *Social Studies in Science* contained a number of articles critically discussing the participation of Steve Fuller, a sociologist of science at the University of Warwick, in the *Kitzmiller v Dover* case, where he testified for the defendants.

As *Social Studies in Science's* editor Michael Lynch writes in his introduction, "The comments that follow include Steve Fuller's dis-

cussion of his testimony in the Dover case, followed by critical commentaries about Fuller's testimony by Kevin Lambert, and by Gary Edmond and David Mercer. These are followed by reflections on their own testimony as expert witnesses by Simon Cole and Mike Gorman, and finally by my commentary on Fuller's and Cole's testimonies."

Social Studies in Science describes itself as a journal "devot-

ed mainly to the results of original research, whether empirical or theoretical, which bring fresh light to bear on the concepts, processes, development, mediations and consequences of modern science and technology, and on the analysis of their social nature."

The contents of the issue are presently available as a free sample on-line at <<http://sss.sagepub.com/content/vol36/issue6/>>.

BOOKREVIEWS



FLOCK OF DODOS: THE EVOLUTION- INTELLIGENT DESIGN CIRCUS

A film directed by Randy Olson
Prairie Starfish Productions, 2006
84 minutes

Reviewed by Steven Pinker

F*lock of Dodos: The Evolution-Intelligent Design Circus* is a documentary about the conflict between creationists and evolutionary biologists over the teaching of evolution in schools. The film divides much of its time between Harvard, where the film-maker received a doctorate in evolutionary ecology, and his home state of Kansas, where the state school board has made headlines for mandating a biology curriculum that casts doubt on Darwinism. On one side we see eloquent spokespeople who state their case with well-chosen facts and arguments. On the other side we see beery poker players with bad hair who ramble on incoherently. Unfortunately, the former group are the creationists, and the latter are the biologists.

Make no mistake; Olson's intellectual sympathies are with evolution. He states that creationism (including its recent incarnation as "intelligent design") is not science and has no place in a biology class. But his emotional sympathies are with the creationists, whom he finds warm, sincere, even sexy. Olson chides biologists for underestimating the strength of the well-

funded, media-savvy "intelligent design" movement, and for failing to put a likable face on science or to state a listener-friendly case for evolution. Scientists, he says, just might become the mythical dodos of the film's title — driven to extinction by their own slow-wittedness.

Flock of Dodos is itself eminently likable. It is narrated with a light touch by the film-maker and punctuated with cartoon dodos, banjo music, local Kansas color, amazing facts about the digestive system of rabbits, and a dotty New Age octogenarian named Muffy Moose who happens to be the film-maker's mother. Like Olson, I have traveled both in academic and media circles, and I share his exasperation at scientists who are about as articulate in public as valley girls. It is hard to know whether to laugh or cry at the biologist who suggests the following strategy for confronting creationism: "I think people ought to stand up and say, you know, 'You're an idiot.'"

Dodos credits the advocates of "intelligent design" with two catchy talking points. One is the argument from design. Just as Mount Rushmore could not have been formed by erosion but requires a human designer, so the vertebrate eye and other organs showing adaptive complexity could not have arisen by chance but implicate a cosmic designer.

The second is the Argument from Irreducible Complexity (also known as "What good is five percent of an eye?") Just as a mousetrap on an assembly line is useless until every one of its parts is in place, so biological systems (from biochemical pathways to whole organs) would be useless in any of the intermediary forms required by a gradual evolutionary process.

These are old arguments, and *Dodos* misses the opportunity to stomp them into the ground Monty-Python-style. First, we

should not trust our intuition when it tells us that signs of design implicate a designer. The power of evolutionary theory is that it shows how an *illusion* of design can be the outcome of a long lineage of replicators that have accumulated any copying errors that increased their rate of reproduction. The point could have been illustrated with computer simulations of artificial life in which complex organs or behaviors, shaped only by natural selection in a virtual world, evolve on a screen before your very eyes. Even if *Flock of Dodos* did not avail itself of this visual proof, it should have found *some* way to make the point. Instead, Olson garbles the theory of natural selection by describing it as a competition among species (rather than among genes or other replicators), leaving the theory impotent to explain the Rushmoresque complexity of life.

As for mousetraps, the biochemist Ken Miller (an articulate opponent of "intelligent design" who is mysteriously absent from the film) has pointed out that a mousetrap missing some parts may not catch mice, but it can do other useful things. It can serve, among other things, as a tie-clip, a key-ring, a clipboard holder, a door knocker, a paperweight, a catapult, a nutcracker, a fishhook, a toothpick or a nose ring. Shifts in function are ubiquitous in biology (such as fins becoming legs after a lineage of fish first clambered onto the shore), and they fully explain how complex organs can evolve: they are gradually retrofitted for a new function while continuing to carry out an older one.

In some ways, *Flock of Dodos* is handicapped by its Harvard lineage. Olson attributes the lack of a coherent voice for evolution to the death of his mentor, Stephen Jay Gould. But Gould himself played an equivocal role in the creationism wars. His lucid essays certainly attacked creationism and illustrated the wonders of evolution. Yet in other ways he inadvertently played into the creationists' hands.

Gould proclaimed that Darwinism was a theory in crisis (based on his calls for minor shifts in emphasis), a proclamation gleefully repeated by the "creation scientists". He vilified some of the

Steven Pinker is the Johnstone Family Professor of Psychology at Harvard University and the author of The Language Instinct, How the Mind Works, and The Blank Slate.

most articulate defenders of the theory, like Dan Dennett and Richard Dawkins, which may be why Olson pitted the evolutionists' B-team against the creationists' A-team. And he ridiculed biologists' attempts to explain adaptive complexity — the very phenomenon that makes creationism plausible to so many people — while championing the eccentric idea (embraced here by Olson) that species are the unit of selection.

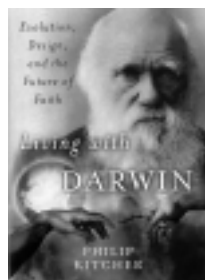
The creationists have a third talking point: "Teach the controversy." In recent years this has served as the fallback stratagem for creationists after several courts had ruled that denying evolution or teaching biblical creationism were breaches of the separation between church and state. It is an obvious ploy to sow confusion about evolution and thereby clear a space in student's minds for religion. Olson never reveals that evolutionary biologists, far from ignoring the challenge, have been agonizing over how to respond to it. If, as Olson suggests, they engage creationists with respectful, carefully articulated arguments, they would be handing them exactly what they wanted. "See," the "intelligent design" advocates would say, "There really *is* a debate here. By trying to censor it from students, they are favoring dogma over critical thinking skills." Since the biologists' case against "teaching the controversy" is that there *is* no scientific controversy, an articulate rebuttal can be self-defeating. Perhaps the best strategy really is to say, in effect, "You're an idiot." That was the response of the judge in last year's landmark case in Dover, Pennsylvania, when he described the creationists' case as "breath-taking inanity".

Though *Flock of Dodos* is not entirely fair to scientists, and sometimes misses the mark on the science itself, it is great fun to watch, and scientists would do well to look in the mirror it holds up to them.

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LIVING WITH DARWIN: EVOLUTION, DESIGN, AND THE FUTURE OF FAITH

by Philip Kitcher
New York: Oxford University Press,
2007. 186 pages

Reviewed by Arthur McCalla

Creationists take every opportunity to remind audiences that the founders of modern science were devout, Bible-believing Christians. This historical truth is the starting point of a new book aimed at a general readership by the distinguished philosopher of science, Philip Kitcher, on the historical entanglement of science and religious doctrine in relation to Darwinism. Kitcher argues that creationism and "intelligent design" are better understood as dead sciences rather than as pseudosciences. Creationist views, broadly speaking, did play a role in the history of geology and the life sciences but they are no longer part of science. Kitcher devotes a chapter to showing, in accessible language, when and why each of the three major anti-Darwinian positions successively became a dead science: "Genesis creationism", or opposition to the idea of an ancient earth in the name of a literal reading of the biblical creation narrative, around 1830; "novelty creationism", which defended the special creation of species against the evolutionary idea that all living things that have ever existed on our planet belong to a single tree of life, around 1870; and "anti-selectionism", or opposition to natural selection as the principal agent of evolution, around 1930. Genesis creationism, novelty creationism, and anti-selectionism have all been revived in our day by those who oppose Darwinian evolution on religious grounds. Kitcher demonstrates that *as science* these attempts to resurrect the dead have failed.

Much of the material in these chapters will be familiar to readers

of Kitcher's earlier writings on creationism and "intelligent design" (including 1984 and 2001). What is new is a conviction that we must take seriously the religious concerns of those for whom the possibility of such a resurrection offers hope and comfort. The bridge to this new conviction is Kitcher's discussion of the slipperiness of present-day "intelligent design" (ID) advocates who publicly present their position as a religiously neutral commitment to anti-selectionism while signaling to conservative believers that it opens the door to biblical creationism. While Kitcher is as firm as ever in denouncing ID as scientifically bankrupt, he is sympathetic to those scientifically unsophisticated Christians who respond positively to it in the hope that it will protect their cherished values. Whereas Kitcher formerly thought that Darwinism was not a threat to religion, he now recognizes that for very many religious people accepting Darwinism means abandoning their hope for eternal life with a loving God — or, in the biblical phrase that provides the title for his final chapter, trading their birthright for a mess of pottage.

The waste, suffering, and inefficiencies inherent in the Darwinian account of life really do contradict providentialist religion's faith in a benign supernatural Creator. Kitcher, however, rejects a "science versus religion" model in favor of an "Enlightenment case against supernaturalism". In so redrawing the battle lines, he widens science to include all intellectual disciplines that derive from Enlightenment empiricism and rationalism while narrowing religion to its supernaturalist forms. He then briefly discusses selected strands of the Enlightenment case against supernaturalism. Biblical criticism has shown that Scriptural accounts of creation are neither

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true historical accounts nor originate in extra-human revelation (Friedman 1997); the sociology of religion demonstrates that religion owes its survival not to being true but to serving important social functions (Stark 1997); philosophical and psychological analyses of religious experience identify the motivations and dispositions that induce people to interpret their experiences in religious terms (Proudfoot 1985; Beit-Hallahmi and Argyle 1997); and ethical reflection reveals the dangers of belief without evidence (Kitcher 2004).

Since providentialist religion depends on supernaturalism, the Enlightenment case against it is devastating. And yet, Kitcher denies on two counts that its inevitable terminus is atheism. First, while science is committed to empirical methods, we cannot assert dogmatically that the universe contains nothing beyond what is currently known scientifically. Second, Kitcher holds out the possibility of what he calls "spiritual religion", or religions "that do not require the literal truth of any doctrines about supernatural beings" (p 133). While acknowledging that spiritual religion will be attacked from opposite directions by supernaturalists and secularists (as indeed liberal versions of Christianity, Judaism, and Islam have been), Kitcher, while remaining himself a secularist, draws on the work of John Dewey (1934) and Elaine Pagels (2003) to assert the possibility of non-supernaturalist religions that would provide their followers with the same emotional benefits as supernaturalist ones do for theirs. Kitcher here aligns himself with an insight shared by modern critical approaches to the study of religion: there is indeed a reality behind the various religions that explains their ubiquity and persistence, but that reality is not the transcendent entity that devotees believe it to be. Emile Durkheim identified this reality as society, Freud as repressed psychical drives, and Kitcher identifies it as emotional comfort in an uncaring universe and, too often, society.

Kitcher's spiritual religion is strongly reminiscent of Auguste Comte's Religion of Humanity.

Comte (1798-1857), the founder of Positivism, thought that any society depends for its survival on a consensus about its objects of belief, devotion, and value. Historically, religion provided that consensus but science has rendered religion obsolete as an explanation of the universe and human life. The result is a social crisis whose resolution will require a functional equivalent of religion; that is, some ideological system that will heal the rupture between our cognitive and our emotional life. Comte's Religion of Humanity was to fulfill this function by attaching our emotions to the true source of morality: the "Great Being" that is Humanity itself (Preus 1987). Like Comte, Kitcher argues that religion is both socially necessary and in its traditional forms intellectually obsolete. Will Kitcher's spiritual religion enjoy greater success than Comte's Religion of Humanity? Readers may have their doubts, but the similarity between their analyses paradoxically illuminates the ways that American religious and social history have diverged from those of Western Europe since the early nineteenth century. As Kitcher's final paragraphs discuss, the peculiarly American phenomenon of anti-evolutionism draws on both an intellectual problem of ignorance of the Enlightenment case against supernaturalism (derived from a unique confluence of populism and biblicism [Noll 2002]) on the part of large numbers of Americans and a social problem of civic anomie and lack of the sort of social security provisions taken for granted by citizens of other affluent countries.

In suggesting that only cooperation among secular (education, social reform) and religious (spiritual religion) forces can terminate the cycle of controversy over Darwinism, this thought-provoking and highly recommended book directs our attention to an often-neglected aspect of the controversy — the spiritual and religious cost of "living with Darwin".

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EVOLUTION FOR EVERYONE

by David Sloan Wilson
New York:
Delacorte Press,
2007.
400 pages

Reviewed by J José Bonner

Picture a ballroom, with couples waltzing and twirling as they circle the room. Now picture it again, with half of the dancers gone, leaving their partners alone. Yet their partners dance on, in the same pose, performing the same dance steps, oblivious to the change, as if they are dancing with ghosts.

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When a hole opens in the floor, the dancers dance on, some disappearing out of sight. And still the dancers dance on.

This is David Sloan Wilson's surreal dream. Every species achieves its adaptations by a complex genetic dance with its environment. Some dance steps are physiological; some are developmental; some behavioral. The sum produces individuals with characteristics that work in their particular world. When the environment changes, some of the dance steps are no longer appropriate; but they are genetically coded, so the individuals perform them anyway. With mutation and selection, some individuals may be born with new dance steps, and new adaptations may arise. Or new adaptations may not arise, and eventually everyone has fallen into the abyss, and the species is no more.

We see this with our own hunger for sugar and fat. We developed our genetic dance steps when food was scarce, and storing fat was necessary to make it through lean times. Now we have supermarkets, but our physiology still dances with scarcity.

Changing physiological and developmental properties is not as straightforward as we might naively think. Consider Dmitry Belyaev, sent to Siberia in the Lysenko era, where he was to establish a new research center. Genetics *per se* did not fit the political reality, but breeding silver foxes for their fur did. So Belyaev bred foxes, selecting for those who were more tame, and easier to work with. Many generations later, the breeding program has tamed the foxes. Along with tameness came curly tails, and other characteristics we typically associate with dogs.

Belyaev selected for a behavioral trait — tameness. So did our ancestors in the domestication of wolves. Apparently, in each case, tameness was achieved by delaying the onset of full adult behavior and its fear of humans. Dogs, and Belyaev's foxes, display puppy behavior. Wolf pups jump on the elders as they return from a hunt, hoping they will disgorge some food; dogs, unless well trained, jump on their humans until quite late in life, something their wild

ancestors give up by the end of the first year.

Evolution for Everyone is filled with wonderful stories, about fish, birds, bacteria, viruses, and psycho male monkeys. The stories are woven together with snippets of Wilson's life, his friends and acquaintances, and the remarkable way that an odd observation can lead to a full-blown scientific investigation. The tone of the book, much like a fireside chat, subtly lays the groundwork for the finale. When it comes, it makes sense, as the various stories fall into place.

The aim of the book is not so much to *teach* evolution to everyone, but to demonstrate that evolutionary thinking can help solve previously intractable problems, even well outside the traditional boundaries of evolutionary biology. Evolutionary thinking applies not just to curly tails, the horns on dung beetles, or to the curious fact that burying beetles regulate the size of their brood to match the amount of available food by eating the excess young. Evolutionary thinking also applies to crime statistics, and the remarkable correlation of life expectancy and violence.

Within a single city, violence is frequent in some neighborhoods, and relatively rare in others. The standard explanation is that people become violent if they are impatient, do not plan for the future, and have unstable, disruptive home lives. If these violent people would just emulate the stable citizens in the suburbs, it was thought, these problems would go away. Let us add an ounce of evolutionary thinking. In violent neighborhoods, life expectancy is roughly 20 years less than for the well-to-do. In this environment, your own future is uncertain and status is conferred by prowess, not wealth or wisdom (there is no wealth, and the schools are chronically under-resourced). This environment triggers the behaviors we see: early pregnancy, so children's survival can be enhanced by their grandparents; risky and violent acts are the only means by which males can gain status (and with it, females).

The problem, Wilson suggests, is not that violent neighborhoods are dysfunctional because of "bad"

behaviors, but that they display the very behaviors we predict would maximize people's fitness in an environment characterized by a short life expectancy. Behavioral change will not occur until we change the environment — but if we do *that*, then change will occur of its own accord. Our behaviors are genetically coded in response to our evolutionary history as a complex collection of if-then statements. A low life expectancy triggers one set of behaviors; a high life expectancy and reasonable security trigger a very different set.

This logic leads to Wilson's finale: apply evolutionary thinking to the future of humankind. Our behaviors, at least those that are partly genetic, have a long evolutionary history. The current "global village" is very new, and we are dancing with ghosts. Behaviors that served us well in small tribes do not match the current reality — such as considering "others" as enemies deserving extinction. If we could but recognize that particular environments favor particular behaviors, then we could consciously design our global, social environment to bring out the behavior patterns that we would most like to see.

I enjoyed this book. I learned things, and with Wilson's guidance, put together ideas that I had previously held separate. I note, though, that there are many segments that require a modest understanding of evolutionary principles, and that will seem to be mere assertions to some readers — particularly those predisposed not to "believe in" evolution. A more precise title might have been *Evolution for Everyone Who Wants to Apply Evolutionary Thinking to Difficult Social Issues*. This is a great challenge, which Wilson handles very well. Along the way, the reader is given glimpses into a great variety of interesting evolutionary studies.

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THE EDGE OF EVOLUTION: THE SEARCH FOR THE LIMITS OF DARWINISM

by Michael J Behe
New York: Free Press, 2007.
320 pages

Reviewed by David E Levin

The same mistakes in the same [pseudo]gene in the same positions of both human and chimp DNA. If a common ancestor first sustained the mutational mistakes and subsequently gave rise to those two modern species, that would very readily account for why both species have them now. It's hard to imagine how there could be stronger evidence for common ancestry of chimps and humans.

One could be forgiven for assuming this to be a quote from a prominent evolutionary biologist. Rather, they are the words of “intelligent design” (ID) advocate Michael J Behe in his new book *The Edge of Evolution: The Search for the Limits of Darwinism* (p 71–2). Oddly enough, Behe regards the notion of common ancestry as “trivial” — a characterization that will ruffle more than a few feathers among his creationist followers. The real issue, he argues, is the role of the designer in the evolutionary process.

This embrace of evolution is a divergence from Behe's 1996 book, *Darwin's Black Box* (New York: Free Press), in which he presented a molecular-age version of the argument from design, most eloquently championed by 18th-century theologian William Paley, which states that conscious design can be inferred from the complexity of living things. Behe, a biochemist at Lehigh University, recast this theological argument in terms of the molecular complexity of living cells. In doing so, he brought to

the ID movement a veneer of scientific respectability. Behe argued in *Darwin's Black Box* that a biological structure or biochemical pathway that would fail to function if any one of its parts were removed could be thought of as “irreducibly complex”. Such complexity, he asserted, could not possibly have evolved, as suggested by Darwin, through numerous step-wise improvements of a simpler system, because the structure or pathway would not function until fully assembled. “Irreducible complexity” of biological systems was denounced universally by the scientific community as an intellectually bankrupt notion because of the great plasticity of the evolutionary process. Components of a complex structure or pathway that are today essential to its function were not necessarily always essential. Components, when initially recruited, may have been merely helpful to the function of a simpler version. Evolution refines function of a complex system both by adding new components and by remodeling existing parts along the way. So it is illogical to look at the final product, with its many well-matched interacting components, and assert that, because removal of a part would destroy function, it must have been created as a complete unit.

Nevertheless, *Darwin's Black Box* was well received by many creationists who believed naively that Behe had posed a serious scientific challenge to evolutionary theory. The book made him such a prominent figure within the ID movement that he served as an expert witness for the defense in the recent case against the Dover, Pennsylvania, school board, which made the fateful decision to incorporate ID into its high school science curriculum. In his landmark verdict for the plaintiffs, Judge John E. Jones III ruled that “ID is a religious and not a scientific proposition” and that “it is unconstitutional to teach ID as an alternative to evolution in a public school science classroom.”

What is perhaps most remarkable about *The Edge of Evolution* is how much Behe now concedes to the evidence that supports Darwinian evolution. He not only

accepts that life has existed on earth for billions of years, but that it has evolved over time. He now agrees with the Darwinian notion that all life on the planet “descended with modification from one stage to another.” He even acknowledges that natural selection is the obvious mechanism by which adaptive gene variants spread through a population. It is difficult to imagine his core audience being receptive to this revised position. But at this point, Behe is stuck between the need to establish a semblance of scientific credibility and the desire to forward his distinctly unscientific creationist ideas.

Behe's new thesis is that there are limits to what Darwinian evolution can accomplish. Evolutionary theory holds that genetic variation within populations is caused by random changes in the DNA, called mutations, which arise each generation. It is this variation that natural selection uses to reshape a population one step at a time. However, Behe believes that random mutation, coupled with natural selection, is not a sufficiently powerful engine to drive the evolution of complex subcellular structures and molecular machines. Most of the really important mutations, he insists, must have been directed by an intelligent agent.

His case for a designer who engineers mutations rests in this book on two arguments drawn largely from the evolutionary battle between humans and the single-celled parasite that causes malaria. To understand these arguments, it is necessary to know something about the interaction between the two species. The parasite lives within the red blood cells of infected people and uses hemoglobin, the protein that carries oxygen to our tissues, as its food source. A variety of human mutations that affect red blood cells have spread through malarious regions of the world because they confer some degree of resistance to infection by the often-lethal parasite, one of the species of *Plasmodium*. The best known of these is the sickle-cell mutation, which arose within a hemoglobin-encoding gene of an individual in

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Africa. The sickle hemoglobin mutation, when present in only one copy, prevents the parasite from establishing an infection. But when both copies of the hemoglobin gene carry the sickle mutation, the result is the devastating disorder known as sickle cell disease.

Behe first argues that sickle hemoglobin, as well as most of the other genetic alterations that have arisen in humans in the battle against malaria, are fundamentally destructive mutations. That is, they typically break or damage existing genes, rather than construct some new, protective system. By contrast, the author is most interested in how complex molecular machines came into existence. He insists that because humans have not evolved any complex structures to combat malaria, random mutation is not capable of such constructive adaptation. But evolutionary theory does not predict how a population will adapt to a selective pressure — only that it will, or that failure to do so will result in extinction. That we have not evolved complex defenses against malaria is no argument that it cannot happen, or that such complexity has not evolved through natural mechanisms in response to other selective pressures across vast geologic time spans.

The author's second argument is one of large numbers. He correctly asserts that in cases where at least two mutations are required before any benefit arises, evolution is impaired. This is because, in the absence of an adaptive advantage conferred by the first mutation, natural selection cannot work to spread it through the population. In such a case, for evolution to proceed, both mutations would have to arise simultaneously — an exceedingly rare event. The example he provides is the evolution of drug resistance in malaria. Resistance to chloroquine, a widely used antimalarial drug, has evolved independently only a handful of times around the world because, according to Behe, resistance requires two specific mutations in the parasite's protein, which have to arise together to confer any adaptive advantage. The parasite, he argues, has been able to solve this problem only because of the vast numbers of these organ-

isms and their short generation time. In animal populations, such as vertebrates, with many fewer numbers and much longer generation times, an adaptive change that requires at least two simultaneous mutations would be so improbable as to be evolutionarily insignificant. Here, he claims to have found the "edge of evolution," jumping to the conclusion that "*No mutation that is of the same complexity as chloroquine resistance in malaria arose by Darwinian evolution in the line leading to humans in the past ten million years*" (p 61, emphasis in original). Throughout the remainder of the book, Behe uses the evolution of chloroquine resistance as a theoretical boundary beyond which random mutation coupled with natural selection cannot extend.

Behe's thesis of evolutionary limits hangs on the assumption that important evolutionary steps require multiple *simultaneous* mutations without the benefit of cumulative selection. However, there is no evidence to support this claim. His error is evident even in his example of chloroquine resistance, which, by his logic, should not have involved evolutionary intermediates. But the scientific data say otherwise. The existence of natural isolates of malarial strains that possess one or the other of the supposedly critical mutations suggests not only that evolution of chloroquine resistance is a stepwise process, as has been argued by others, but that there are multiple mutational paths to resistance.

He applies the same unfounded assumption to assert that the evolution of new protein-to-protein interactions, a critical step in the assembly of complex cellular machines, is not possible without the assistance of a designer. His reasoning is that five or six simultaneous mutations would be required to generate a new interaction site, and the likelihood of a protein's acquiring so many random mutations at once is vanishingly small. This number is based on the requirements for tight associations that antibodies form with their targets — interactions that involve five or six protein parts called amino acids. However, Behe

ignores volumes of experimental evidence that many classes of proteins can interact with other proteins through the recognition of fewer than five amino acids. For example, enzymes that add sugars to other proteins (often important to their function) typically recognize as few as two amino acids. Although such enzymes normally interact only transiently with their target proteins, weak interactions can evolve gradually into stable associations through the sequential accumulation of mutations if the association confers an adaptive advantage. Behe's logical error here is identical to the one he committed in asserting that many biochemical pathways are irreducibly complex. He looks at the final product, incorrectly assumes that each part always existed as it does today, and cannot imagine how stepwise evolution could have generated such an integrated system.

Behe is likely aware of at least some of the existing evidence that new protein-to-protein interactions have evolved. One must look no further than one of his acknowledged examples of evolutionary prowess. Under the heading of "What Darwinism Can Do," he describes the stepwise evolution of an antifreeze protein from a digestive enzyme in Antarctic fish. This was an important evolutionary adaptation that allowed fish that possess this protein to survive in frigid Antarctic waters. However, he omits an interesting detail from his description — the antifreeze protein has sugars added to it (by an enzyme), whereas the protein from which it evolved does not. Therefore, a new protein-to-protein interaction must also have evolved to allow modification of the antifreeze protein. In fact, this beautiful example of evolution involves the construction of significant complexity.

The author next uses his unsupported claim that groups of simultaneous mutations are required for the evolution of complex cellular structures in a weakly argued attempt to define a demarcation between intelligently designed features and those that arise through Darwinian evolution. Behe allows that random mutation and selection are capable of driving the evo-



lution of closely related species and perhaps even account for the divergence between humans and chimpanzees. But he asserts that design extends from the early construction of cellular machinery all the way into the animal kingdom at least through the separation of vertebrate classes — mammals, birds, reptiles, amphibians, and fish. This is because these classes possess unique cell types, the appearance of which he assumes to be beyond the “edge of evolution.” With only his flawed logic to support his claims, Behe’s perceived “edge” reflects nothing more than the limits of his own conceptual horizon.

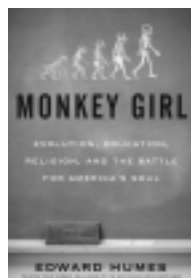
The final chapter is devoted to a philosophical discussion of the designer’s identity and motivations. Although Behe describes himself as a “pretty conventional Roman Catholic,” he dissembles here in quoting philosopher Nick Bostrom, “The ‘agent’ doing the designing need not be a theistic God.” Considering Behe’s testimonial concession at the Dover trial that “the plausibility of the argument for ID depends upon the extent to which one believes in the existence of God,” this position seems disingenuous and intended to distance his ideas from their religious foundations. As for the goal of the designer, Behe claims that it was none other than the emergence of intelligent life. Here, he makes the classic creationist error of assuming the primacy of humans among all living things, a distinctly religious notion. Behe offers no evidence or arguments to support this presumed goal, yet remarkably clings to his insistence that ID is a scientific proposition.

In the end, the most irritating aspect of this book is Behe’s selective use of the ever-expanding base of scientific knowledge as a soapbox from which to shout his embrace of perpetual ignorance. The better our understanding of the intricate details of complex biological systems, the stronger is his belief that they must have been designed and that science will never unravel how they came to be. This is a trend for him. As Eric Rothschild, chief counsel for the plaintiffs at the Dover trial, observed of Behe’s claim that the

immune system is irreducibly complex, “Thankfully, there are scientists who do search for answers to the question of the origin of the immune system ... Their efforts help us combat and cure serious medical conditions. By contrast, Professor Behe and the entire “intelligent design” movement are doing nothing to advance scientific or medical knowledge and are telling future generations of scientists, don’t bother.” Scientists have never listened to him. But with so many concessions to evolution mixed with his new message of God-as-mutagen, will anyone?

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MONKEY GIRL: EVOLUTION, RELIGION, AND THE BATTLE FOR AMERICA'S SOUL

by Edward Humes
New York: HarperCollins, 2007.
400 pages

Reviewed by Warren Eshbach

One of several books being published about the *Kitzmiller et al v Dover Area School District* trial in the US District Court in Harrisburg, Pennsylvania, is *Monkey Girl* by Pulitzer-Prize-winning journalist Edward Humes. Using interviews with parties on both sides of the issue along with his personal observations in the

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courtroom, Humes presents a thorough account of issues and personalities surrounding this event.

The author reflects on the culture, attitudes, and religious/political viewpoints of many residents of the Dover community. Starting from the description given of Carol and Jeff Brown in the opening chapters to the interviews with both plaintiffs and defendants, Humes describes the attitudes and perspectives of many Dover area residents. He notes how their views on science and religion shaped much of what took place in Dover, a small town with a culture war on its doorstep over science education and a literalist biblical interpretation.

The book describes the events leading up to the trial, the attitudes of some of the key players, the trial itself, the importance of the science community and the historic decision of Judge John E Jones III. The reader is never bored by details, but is engaged, and at times appalled at the lack of knowledge about science and education by a majority of the elected/appointed school board, a group of the community’s religious leaders, some school administrators, and the citizenry at large.

A key chapter in the volume is entitled “Monkey Suit”; it describes the futile efforts by science teachers to inform the school board of the difference between science and religion, fact and theory and why “intelligent design” was not an accepted scientific theory. Unfortunately, most of the board was not receptive to this information. One of the board members admitted turning a “deaf ear” to the science teachers who could have enlightened them (p 227). As Humes puts it, “They just didn’t listen.”

With statements and references, the author further describes how the school board and some administrators exercised poor judgment and poor leadership. Decisions were based on views steeped in religious emotion and opinion rather than scientific fact or logical integrity. In a down-to-earth, no-nonsense way, Humes describes attitudes of board members, civic leaders, and a segment of the population that represent ignorance, lack of principle, and poor judgment.

ment. In my opinion, this is the real danger to education and government today!

Humes suggests that a bright light in this tunnel is the courage of the plaintiffs, their legal team, the science teachers, the science community, and a few theologians, not to mention the judge who literally risked his life in seeking a decision based on evidence and precedent. The author recognizes the leadership of the National Center for Science Education in this regard.

It is clear from the outset that Humes's sentiments lay with the plaintiffs in this case. From evidence presented, it is also clear that the Dover school board's decision regarding "intelligent design" was not the case that was beneficial to the "intelligent design" movement or to the Discovery Institute. In fact, some key witnesses in these groups removed themselves from defense testimony (see RNCSE 2006 Jan-Apr; 26 [1-2]: 45-6).

Humes's story illustrates how a literalistic interpretation of Judaeo-Christian scriptures was used to guide the emotions of the Dover school board to their decision. The author points out the deep need for a new and continued dialog between science and theology, and the role each discipline must play in guiding the 21st century's understanding of a changing universe.

Leadership is important to the success of any institution. Good leadership always seeks to listen to all perspectives, engage in conversation and collaboration with various points of view and search for the truth in decision-making. The account given by Humes is that this did not happen in Dover as the school board reached its decision for the reading of a one-minute "intelligent design" statement.

This book will find a general readership, but should be read also by the educational community to gain an understanding of the concepts striving to shape scientific and theological thinking in the next generation.

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DOUBTING DARWIN? CREATIONIST DESIGNS ON EVOLUTION

by Sahotra Sarkar
Malden (MA): Blackwell, 2007.
214 pages

Reviewed by Michael Ruse

When I first heard that this book was being written, I confess that I was skeptical. We have heard a huge amount in recent years about so-called "intelligent design" (ID) and much that we have heard has been very critical. Why then do we need yet another book on the topic? Now that I have had a chance to read the finished product, I think I was wrong and that my doubts were overstated. This is a splendid discussion of the whole question of ID. It is true that Sahotra Sarkar, a well-known philosopher of science, like most philosophers has little interest in going behind the scenes to dig up the real motives of ID enthusiasts — their religious drives. But, sticking to his task and looking fairly at all of its claims to be science, Sarkar does a great job of rejecting decisively the claims of ID. With a reservation to be noted, this is an excellent primer to the subject.

Sarkar plays things in a very straightforward manner. After an introductory overview, he begins with the thinking of Charles Darwin and Alfred Russel Wallace, taking things up through the discovery of Mendelian genetics. Then we have a discussion of the argument from design — the eye is like a telescope, telescopes have telescope designers, therefore the eye must have had a designer, namely God — and the ways in which Darwin's theory of evolution through natural selection

roughs up this argument. Rightly, Sarkar has little sympathy for the attempt by leading ID exponent William Dembski to bring this argument back to life.

On then to discussion of contemporary evolutionary biology. Overall, this is very fair and balanced, with a good discussion of the neutral theory of evolution as compared to the more standard Darwinian selectionist theory. I do confess however, that Sarkar's contempt for human sociobiology, very evident here but a leitmotif through the book, started to grate a little. Why keep harping on the point? Of course, his discomfort shows that he is not a blind selectionist, but the point could have been made once and then left.

Now, the biological science given as a foundation, Sarkar starts to rip into the claims of the ID side. First, he goes after William Dembski's invocation of No Free Lunch theorems, supposedly showing that selection cannot be that effective. We learn that Dembski is mistaken mathematically and, even if he were not, the evolutionary situations to which he would apply these theorems are not relevant. Then on to Michael Behe's claims about irreducible complexity. Sarkar is right, although I doubt he will have much effect. Behe has recently published a new book (*The Edge of Evolution* [New York: Free Press, 2007]; see review, p 38) showing that he is quite indifferent to the many criticisms of his work. If you can't answer them, ignore them!

We move on to information theory and then to the trendy anthropic arguments. These are the arguments that work from the improbability of the laws of nature being as they are, and the necessity for life of the laws of nature being as they are for life to appear, to the existence of a supreme law-maker or some such body. Strictly speaking, as Sarkar realizes, these are not part of the ID package and are in fact popular among people who detest ID. They are not intended to replace science but rather to supplement theologically or philosophically. But I think Sarkar is right to include them, because at some level they have the aim of ID,

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namely to resurrect the argument from design. Biologists got the argument out of science in the 19th century. Who would have thought that physicists would be trying to bring it back in the 21st? I agree with Sarkar's arguments — how can one argue about any kinds of probabilities when all one has is a set of one? But I would like to have seen some discussion of Steven Weinberg's claim (which strikes me as plausible) that the world is nothing near as fine-tuned as is claimed by people like my former colleague, the philosopher John Leslie.

So we move on to a discussion of naturalism and a final chapter ending with the wrongness of including ID in biology classrooms. I think readers will appreciate Sarkar's careful discussion of kinds of naturalism and his rejection of the critics like Alvin Plantinga. Of course, although Sarkar can refute Plantinga, one doubts that Sarkar will change Plantinga's mind. This will have to wait until we evolutionists can show people like Plantinga that they can be evolutionists and Christians at the same time. Or rather, not just show them, but convince them. With works like *The God Delusion* on the best-seller list, I am not holding my breath.

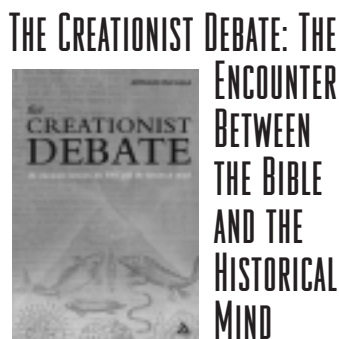
What is my reservation? Although Sarkar writes clearly and gives carefully chosen examples, I still feel that he is too technical for the general reader. This might be a good book for a more advanced philosophy of science class, with a qualified teacher, but it is not for the person picking something up off the shelves of Borders or Barnes and Noble. Sarkar gets into mathematics and he is not always aware of how difficult even fairly straightforward discussions can be. Take for instance the discussion of evolutionary algorithms that is a crucial part of Sarkar's attack on Dembski's use of No Free Lunch theorems. I defy anyone without some background training to understand the definitions that are given or the subsequent discussion.

Or put things this way: William Hamilton's formal discussion of kin selection was complex and mathematical. In *The Selfish Gene* (Oxford: Oxford University Press,

1976), Richard Dawkins brilliantly explained all of this in words. I am afraid that Sahotra Sarkar is no Richard Dawkins. But then, no one else is either! Judged on his own terms, Sarkar is right at the top of what he is doing. Get this book and read it.

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by Arthur McCalla
London: T&T Clark International,
2006. 288 pages

Reviewed by J David Pleins

It is a curious war story.

Where other authors might see in the centuries from Galileo to Phillip Johnson a war between religion and science, McCalla carefully recounts the real battle: the struggle between reactionary religion and a belief that seeks understanding.

The first volleys were thrown in the Renaissance and the Reformation. McCalla identifies the challenge of Galileo's day as not simply the telescope, but the shift in consciousness away from seeing nature and the Bible as realms of symbol toward the Reformation's "plain sense" view of Scripture and the world. This is McCalla's thesis in a nutshell: Mechanical-mindedness about nature, when coupled with historical-mindedness about the Bible, necessitates a new view of both God and Nature.

Despite the hankering to unlock nature's mechanics, creationists have not been able to give up their addiction to "purposiveness". John Ray saw purposes in the wind and male nipples. It was

jarring to move away from such purposiveness to a world view dominated by extinction, imperfection, and lack of providential planning. Major steps were taken when Hooke and Steno unlocked the fossils: "Mother Nature had become a woman with a past," McCalla writes. It would be a while before the earth's deep time would be comprehended. In the meantime, Thomas Burnet constructed a fiery engine for the earth's geology within the confines of a biblical chronology. Christian historical consciousness worked overtime on the biblical clock, even as global explorers encountered civilizations with calendars far more ancient than the Bible's.

The historical bug bit hard in the Age of Exploration as Erasmus, Valla, Cappel, Simon, La Peyrère, and a host of others began to look at the Bible as any other document, one marred by textual corruptions and betraying an ancient mentality. Removing Moses from the pantheon of biblical authors brought a new consciousness about the foundations of Christianity itself. As the Bible became a local map of the Jewish landscape, its usefulness for navigating history's broad waters was diminished forever. With Matthew Tindal, Thomas Paine, and the rise of Deism in the 18th century, it would not take much to treat the Bible as just one more fanciful collection of ancient anecdotes. As deep time came into view with the unwrapping of the primary and secondary rocks, biblical frames were put to further tests. Then, as Cuvier sequenced the animal strata, the biblical picture was undone completely. Entire worlds long forgotten were discovered in the Book of Nature that gleaned neither a jot nor a tittle in sacred scripture. The Bible had no frame for this new historical horizon. The cosmic shakeup wrenched hearts like Tennyson's (McCalla gives us ample extracts) and stirred John Ruskin to exclaim, "If only the Geologists would let me alone, I

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could do very well, but those dreadful Hammers! I hear the clink of them at the end of every cadence of the Bible verses.”

Charles Darwin, of course, was a creature of his time, searching for design and worrying about the Bible’s frame. He was also a creature of his time in following a new tributary, letting science and not the Bible dictate what he discovered. Neither male nipples, the misery of the world, nor the basis of human morality was designed by God, as far as Darwin could tell.

The conservative Christian reaction to all this was predictable, if not instructive. They were bothered by the science but perhaps more so by the moral wilderness created by evolutionary secularism. Liberal Christians, for their part, went so far as to re-invent the Fall of Man and the concept of the eternal soul, weathering the theological storm for a time. But by the end of the 19th century, as even the human mind was seen by many to be a product of evolution, theology of the liberal sort could not constrain science’s profound shift in human historical consciousness.

The 20th century became one long century of conservative Christian “special pleading”. To be sure, fundamentalists were not entirely literalistic about Genesis 1, at least at the start. Key figures like Bernard Ramm insisted that while Darwin’s mechanism was wrong, still the Bible and a kind of evolution could be blended. Yet louder voices like those of Billy Sunday, Dwight Moody, William Bell Riley, and Gresham Machen prevailed against any belief in evolution. The Scopes trial was one skirmish on this anti-evolutionary revivalist battlefield. For a time, conservative Christians continued to accept an old fossil earth alongside their anti-evolutionism, but the plain reading of Genesis 1 encouraged Whitcomb and Morris in the 1960s to champion literalism with a vengeance. The rise of “intelligent design” has reinforced this anti-Darwinian tendency, as in the name of microbiology and information theory, its proponents seek to revive Paley’s design view while clashing swords with secular scientists and liberal religionists.

McCalla’s is a well-told tale.

Invariably, however, even in such a comprehensive book there will be chapters left to tell. As biblical “higher criticism” developed in the 19th century, archaeological adventurers discovered Assyrian and Babylonian creation myths that paralleled the Bible, underscoring the mythic character of Genesis. Liberal Christians have found something powerful in religion’s mythic side and this story deserves telling. Also, given the press coverage of William Ryan and Walter Pitman’s book *Noah’s Flood*, I am surprised that McCalla overlooks more recent attempts to put Genesis on a secularized historical basis. The Bible’s legends may have compelling historical origins worth considering. Lastly, the world of modern Christian evolutionists goes untouched, omitting discussion of such figures as Teilhard de Chardin, John Polkinghorne, John Haught, Arthur Peacocke, and Kenneth Miller. There are religionists who remain committed to combining Darwin and religious belief in a non-rejectionist fashion. Their story deserves to be heard alongside “intelligent design” reactionism.

These are really minor criticisms. McCalla’s book is well worth adding to your collection. No one has brought all the key players under one roof and done so this crisply.

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THE CHALLENGE OF CREATION: JUDAISM’S ENCOUNTER WITH SCIENCE, COSMOLOGY, AND EVOLUTION

by Natan Slifkin
Brooklyn: Zoo Torah/Yashar Books,
2006. 357 pages

Reviewed by Shai Cherry

One cannot help but admire Rabbi Natan Slifkin. Only a person of faith, in God and/or humanity, could experience the barbs of

excommunication and refuse to retreat. Slifkin is convinced that evolution is the best explanation for the wonders of the world. He sets out to overwhelm his readers with a barrage of evidence that evolution is both true and compatible with classical Jewish thought.

The Challenge of Creation is an augmented revision of Slifkin’s *The Science of Torah* (2001). The latter text was banned by a group of Ultra-Orthodox Rabbis in Israel and America in 2005 for, ostensibly, professing scientific theories held by these rabbis to denigrate the Jewish tradition. (An account of the “controversy” can be found on Slifkin’s website <<http://www.zootorah.org>>.) Slifkin responded to the ban by buttressing his arguments with dozens of quotations from Jewish sages and contemporary scientists, aiming to demonstrate to members of Slifkin’s own Ultra-Orthodoxy that the science of evolution is kosher. (The Ultra-Orthodox, unlike the Modern Orthodox, generally eschew secular education beyond high school.)

The first section of the book is devoted to the worth of science and its debt to Judaism. He proceeds by quoting an impressively wide array of sages, Jewish and secular, to demonstrate that faith in God can be reinforced through an appreciation of nature. Furthermore, the development of science itself was only possible in a world in which one assumed the regularity of natural laws. Yet, in pandering to his audience, who he rightly suspects is skeptical of his aims, Slifkin makes such chest-thumping statements as: “The entire scientific enterprise has its roots in religion, specifically monotheistic Judaism” (p 31). Slifkin avoids mention of the contributions of Greek philosophy.

Slifkin announces early on that

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A HARSHER VIEW OF SLIFKIN

Shmuel-Pairont de la Meyraque offers a harsher assessment of Slifkin's *The Challenge of Creation* in a review on the TalkReason website. He was unimpressed with Slifkin's previous book, *The Science of Torah*, regarding it as a tendentious assemblage of quotations betraying a superficial knowledge of the scientific topics that it addressed. While sympathetic to Slifkin on account of the condemnation of his work, de la Meyraque is nevertheless similarly unimpressed with *The Challenge of Creation*, writing:

Alas, almost all the weaknesses of the original manuscript are found in the book in question as well. ... In one respect the book is substantially worse than the original manuscript: the latter was relatively short while the book is very long, and (sorry, again, for being blunt) intolerably boring. One hardly can find in the book original notions — almost all of it has been said time and time again by proponents of compatibility of the biblical story with science.

After taking exception to a number of specific claims in *The Challenge of Creation*, de la Meyraque concludes, "The examples of utter bunkums in Slifkin's book can be continued, but I think the quotations given so far are more than sufficient to conclude that Slifkin's opus is a practically useless piffle produced by a semi-educated (except for matters of Judaism) but very self-confident and ambitious writer lacking qualifications to pronounce judgments on important philosophical and scientific problems."

For the complete review, visit <<http://www.talkreason.org/articles/SlifkinReview.cfm>>. [Thanks to Mark Perakh for informing NCSE about the review.]

he disagrees with the approaches of reading science into the Torah, as has been practiced by several Orthodox physicists of late (Cherry 2006), as well as the rejection of science because of its incompatibility with the plain sense of Genesis (p 19). Towards the heart of the book, as Slifkin analyzes medieval Jewish philosophers and cites contemporary non-Orthodox thinkers (including me), Slifkin reveals that the opening of the Torah is a mythical narrative aimed primarily at "uprooting pagan concepts of the world" (p 213). The intention of Genesis is not to teach science, but to disabuse Israelites of the idolatrous conceits of Israel's ancient neighbors. This vision of Genesis may be innocuous in the academic world, as well as in progressive Jewish circles, but it is risqué reading within the world of Ultra-Orthodoxy. The fear is that if one interprets creation non-literally,

what about the commandments (p 214)?

Slifkin points out, for instance, that the Torah's light was created on the first day but the sun was not created until day four. Our normal experience is that light comes from the sun, so having pre-solar light is miraculous. It is also polemical since the sun was held to be a deity by the Babylonians. In the Israelite account, the sun was demoted to the fourth day of creation to emphasize that it, like all else, is just another one of God's creations. In other words, Genesis no longer presents any difficulty in accepting contemporary scientific accounts of natural history because it was never intended as a scientific account. As Galileo wrote, citing Cardinal Baronius, "The Bible was written to show us how to go to heaven, not how the heavens go." Or, in Slifkin's own words: "We should not be trying to understand Torah as *National Geographic*" (p 233).

To the Rabbi's credit, he recognizes that he has only resolved the textual difficulties between Genesis and evolution. The theological difficulties remain. How does one reconcile the loving, providential deity of tradition with the fact that 99% of all species to have ever evolved on the planet are extinct? How does one accept a scientific theory that is predicated on chance mutations and the lack of a pre-ordained teleology? Slifkin acknowledges the tension and presents several modern Jewish thinkers who have grappled with these issues. His suggestions are less impressive than his openness to the questions (for a discussion of three sophisticated Jewish thinkers on this subject, see Cherry 2003).

But what is impressive, or condemnable depending on one's point of view, is how Slifkin negotiates the traditional stumbling blocks of deep time and evolution. The truth of the six days of creation in no way conflicts with the truth of billions and billions of years when there was an ongoing transmutation of species. Genesis is not *National Geographic*; it is instead an ancient Near Eastern creation myth incorporating a polemic against Israel's polytheistic neighbors. That is a potentially

powerful message to the 40% of Americans who believe that the world was created basically as it is today within the last 10 000 years. Several of his chapters should be required reading for all young-earth creationists.

The Challenge of Creation, though, is unlikely to influence directly that American (Christian) audience. Slifkin wrote an apologetic, parochial tract couched in the conventions of the Ultra-Orthodox, a group that will likely continue on its benighted way. Slifkin's bibliography was incomplete; for instance, he omitted the relevant work by Judah Landa, *Torah and Science* (1991). He also fell short of academic standards of citation. Slifkin's work is neither a traditional work of Jewish scholarship, nor a universal, academic one. True to its topic, it is something of a transitional species.

In sum, what is most amazing about this book is that it is a product of an Ultra-Orthodox rabbi. His community, however, is likely to ignore it because of its sophisticated approach to the topic that draws on the expertise of people from outside the community. Those beyond the Ultra-Orthodox community are likely to ignore the book — or worse — because of its occasionally dense style and shortcomings as a text for the general population. It is a shame that Rabbi Slifkin's piously provocative work will likely not get the attention it deserves — unless, that is, it comes under an even wider ban.

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NOT BY CHANCE! SHATTERING THE MODERN THEORY OF EVOLUTION

by Lee M Spetner
New York: Judaica Press, 1998.
262 pages

Reviewed by Zev Stern

This book is one of a sub-genre of creationist screeds written by (and directed at) Jewish fundamentalists. Its intent is made clear in the subtitle; one would suppose that a little humility would be in order. Like similar tracts written by Christians, it relies on the reader's ignorance of both evolutionary theory and the processes of science in general to make its case; that such works can get a following is a reflection of the sorry state of science literacy among the general public. Spetner shows the chilling effect of opposition to evolution on students' understanding of its central role in biology — an outcome he would be happy to reinforce — in his footnote on page ix, where he states that his biology teacher in 1940 must not have believed in evolution because she never mentioned it in class. Every biology teacher in America knows precisely why Spetner's biology teacher never mentioned evolution in her classroom. It was not because evolution is unsupported scientifically.

The crux of Spetner's argument is that no observed genetic mutation "adds information" to the genome; all mutations result in a loss of information, therefore evolution cannot account for the observed variety of species. It is obvious that the history of life on earth from single cells to complex multicellular organisms (including

humans) entails a tremendous gain of information. If Spetner contends that evolution cannot account for that gain, it falls to him to propose an alternative explanation that can. This he does, in chapter 7. According to his "nonrandom evolutionary hypothesis", changes in the environment cause insertion sequences in the DNA to activate previously dormant genes. That is, the information was there all along, but was not the result of genetic mutation. So how did it get there? The implied answer, creation, is not a scientific explanation and does not generate testable predictions. This may not bother Spetner, but it certainly disqualifies his "hypothesis" from being presented to students as science.

In reality, genetic mutations and subsequent re-arrangement *can* increase the information content of the genome. Replication errors are known to cause gene duplications; the duplicated gene can then mutate to novel forms, while the original remains intact. We now know that, at least in eukaryotes, many if not most genes are composed of "domains" or modules, separated by noncoding sequences. Transposons can shuffle domains from several polypeptides to generate new ones, and this adds information. Even routine "missense" mutations in diploid organisms add information; one of the copies of the human hemoglobin gene, for instance, mutates to sickle-cell hemoglobin. The person carrying this mutation now makes both forms of hemoglobin. This is a gain of information, and if the person happens to live in a malarial region, it is beneficial, and natural selection will spread the mutant gene throughout the population.

Spetner's second major point, made in chapter 4, is that the probability of earth's present variety of species arising by what he calls the random processes of evolution is zero; that is, it is mathematically impossible for evolution to have produced what the theory demands. A bit disingenuously, Spetner writes, "We often use the word *impossible* to mean a very small chance, or something *very improbable*. Just how improbable an event must be to be called *impossible* depends on who's

judging" (p 94, emphasis in the original). The general public may understand the word *impossible* that way, but scientists (and Spetner is a physicist by training) certainly do not. A low probability is just that.

Moreover, evolutionary theory does not demand any particular outcome; as upsetting as it may be to Spetner (p 22), there is no *a priori* reason to suppose that evolution would result in the appearance of *Homo sapiens*. All that is required is an outcome consistent with "descent with modification," to use Darwin's phrase, which remains as good a summation of evolutionary theory as any. Because the number of inputs (genetic and environmental changes) is so vast, one cannot rationally predict any particular outcome, but that there will be an outcome is virtually certain as long as conditions on the planet are compatible with life. An analogous situation is provided by the New York Lottery; the probability of *any particular* six-number sequence's coming up is so vanishingly small that one cannot rationally predict a particular sequence, but we know that *some sequence* will come up ... every *single time*!

Spetner also exploits the common misunderstanding of the concept of randomness as it relates to evolution. Genetic change is random *only with respect to the needs of the organism*. Spetner indicates as much (p 51), but does not work through the implications. Instead, he proceeds as if each mutation (and each new species) were a fresh roll of the dice, unconstrained by pre-existing conditions. Actual genetic changes are constrained by neighboring nucleotides in the codon, neighboring amino acids in the coded polypeptide, where a transposon or translocated segment inserts itself in a chromosome, and many other factors. This is illustrated in a thought experiment brought by Thomas Robson ("Creationism and pseudomathematics", *RNCSE* 2000 Jul/Aug; 20 [4]: 20-2; see also David Bailey, "Evolution and probability", *RNCSE* 2000 Jul/Aug [4]: 23-5). A computer is programmed to generate a string of 100 random



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digits from 0 to 9. Before the operation begins, the probability of any given string appearing at random is 10^{100} . Once the first digit (5, say) is generated, the probability of any given sequence becomes 10^{99} ; the sequence is constrained by the previous draw to those sequences that begin with 5. Likewise, the probability of any given sequence's appearing increases by an order of magnitude with each draw until, after 99 draws, the probability is 10^1 (or one in ten). People bet the stock market on longer odds than that.

A reader unfamiliar with the methods and processes of science might be misled by Spetner's statement (p 20) that by the 1930s evolutionary theory was haunted by unanswered riddles and was in serious need of repair and updating. Far from being a weakness of the

theory, this is science at its best! All scientific theories (unlike divine revelations) are repaired and updated in light of new evidence. However, if Spetner has evidence that necessitates revising the theory or even discarding it altogether and substituting something else, he should submit it to the scrutiny of his peers in a refereed journal.

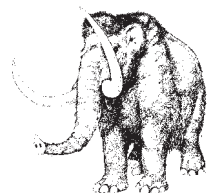
Spetner attempts to resurrect the Argument from Design, that is, that the complexity we observe in the living world testifies to a Designer. Any child who plays with a kaleidoscope creates intricate and beautiful designs without a designer, at least one who planned the design in advance and intelligently carried it out, and natural selection acting on random genetic change remains the best natural explanation for the design of the living world.

Today's political climate dictates that this book review double as a clarion call. This book shows that hostility to evolution is not limited to Christians. It is shared by fundamentalist Jews and Muslims as well (see Ümit Sayin and Aykut Kence, "Islamic scientific creationism: A new challenge", *RNCSE* 1999 Nov/Dec; 19 [6]: 18-29; Taner Edis, "Cloning creationism in Turkey", *RNCSE* 1999 Nov/Dec; 19[6]: 30-5; and Taner Edis, "Islamic Creationism in Turkey", *Creation/Evolution* 1994; 4 [1]: 1-12). We find it in Native American author Vine Deloria Jr (*Evolution, Creationism, and Other Modern Myths* [Golden (CO): Fulcrum, 2002], reviewed by David Brumble in *RNCSE* 2005 May-Aug; 25 [3-4]: 49-50). Even some secular campus liberals maintain that science in general is merely the myth of Western civilization, not deserving of any more credence than the myths of other cultures. All this occurs against a backdrop of breathtaking advances in evolutionary research (see Elizabeth Culotta and Elizabeth Pennisi, "Evolution in action", *Science* 2005; 310: 1878-9).

Spetner's book reminds us that large numbers of people are still willing to ignore reality when it appears to conflict with their cherished beliefs. The earth is round. The earth and the other planets revolve around the sun. Living species on earth arise by descent with modification. All are cornerstones of modern science. With our efforts and vigilance we will see a time when the third statement generates as little negative reaction from the public as the first two.

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A MOMENT FOR SLIFKIN

Moment magazine, which bills itself as the largest independent Jewish magazine in North America, published a long article on "The Heresy of Nosson Slifkin" in its October 2005 issue (available on-line at <<http://www.momentmag.com/features/oct05/slifkin.html>>). In this article, Jennie Rothenberg discusses Natan (Nosson) Slifkin's work and the hostile reaction it received from a number of ultra-Orthodox rabbis. She concludes:

In the end, a number of observers agree that the Slifkin controversy has very little to do with science, evolution, or the age of the universe. The ban represents a rift between two different factions of Ultra-Orthodox Jewry. One looks backward to the days when fatherly rabbis in European shtetls could steer their followers away from troubling foreign ideas. The other resigns itself to a world where floods of information from television and the Internet might seep into even the most insular Orthodox communities. Slifkin's books were written for disoriented Jews who are seeking a new center in an increasingly decentralized world; the rabbis who signed the ban are holding fast to an old center that they believe science and secular society are threatening to pull apart.

Rothenberg reviewed Slifkin's *The Challenge of Creation* (reviewed by Shai Cherry in this issue of *RNCSE*, p 43) along with Michael Ruse's *Darwinism and its Discontents* in the October 2006 issue of *Moment* (available on-line at <http://www.momentmag.com/books/oct06/MOM-2006-10_creation.html>), writing:

As a "theistic Darwinian evolutionist," Slifkin has carved out a lonely niche for himself. Secular readers might have trouble with some of his more traditional thinking, and biblical literalists will continue to take offense at his allegorical readings of Genesis. But his intended audience — religious Jews facing crises of faith — will be hard-pressed to find a more carefully crafted book of ideas.

JEWISH TRADITION AND THE CHALLENGE OF DARWINISM

edited by Geoffrey Cantor and Marc Swetlitz
Chicago: University of Chicago Press, 2006. 240 pages

Reviewed by Oren Harman

Wherever one turns these days — from television interviews, to radio debates, to courtroom dramas, to the limitless bounds of the printed press — the ongoing saga of humankind's grappling with the implications of science for the meaning of faith seems ever-present. In particular, the debate between evolutionists and the latest incarnation of creationists has suffused the consciousness of many Americans and awakened their political sensibilities. When considering the clash of science and religion in modern times, what is perhaps not always consciously internalized and made explicit is the extent to which descriptions in the English language of this battleground are restricted to the Christian encounter with Darwinism, to the exclusion of other faiths. We should not be surprised by this fact, since the current battle over the teaching of evolution is being waged, almost exclusively, by evangelical Christians, and since the English-speaking world is primarily Christian. Historical scholarship, too, has been skewed towards the reception of Darwinism in a Christian context; after all, it was in Anglican England that Darwin's ideas were first formed and disseminated.

How refreshing, then, to encounter a treatment of the challenge of Darwinism to the Jewish faith, in a new collection of essays edited by Geoffrey Cantor and Marc Swetlitz, following an academic conference on the subject in March 2004 at Arizona State

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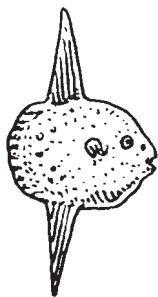
University. Very little has been written about Jewish responses to Darwinism until now, and although the collection of essays is somewhat idiosyncratic and far from comprehensive, it is a hopeful beginning of a welcome expansion and broadening of scholarship on the challenges posed to religious thinking by Darwinian evolution, both past and present.

What is perhaps unique to the cases explored in *Jewish Tradition and the Challenge of Darwinism* is the extent to which the encounter of Judaism with evolutionary thought has been molded by the relationship between Jewish and Christian communities on the one hand, and the dynamics operating within the various Jewish factions on the other. The reality of assimilation and the fear that it would be encouraged or broadened by secular scientific thinking has played an important historical role in the reception of Darwinism in Jewish communities; no less so, however, has the internal divide and political dynamic among Orthodox, Conservative, Reform, and Reconstruction Judaism been reflected in each group's unique attitudes towards the idea of evolution and its moral and practical consequences. From outright rejections of Darwinism espoused by biblical literalists, through attempts of modern-Orthodox scientists to explain how the Bible accords with modern-day interpretations of nature and her ways; from Kabbalah-inspired hermeneutics, to "practical fundamentalism" (see the interesting chapter by Ira Robinson), Jewish responses to Darwinism have reflected the need of the various communities to define themselves both with an eye inward and a glance towards the outer world. The responses have been quite varied and creative; often, they have been surprising. Rabbis AI Kook and JB Soloveitchik, for example, two of the giants of early-to-mid-20th-century Orthodox Judaism in Palestine and in the United States, respectively, both embraced evolutionary thought based on their readings of canonical, normative Jewish texts and exegeses. In contrast, Rabbi Abraham Geiger, a leading

19th-century figure in the ostensibly more progressive and less theologically rigid Reform Movement, rejected Darwinism vehemently.

Jewish responses to evolution have themselves evolved as a function of the internal and external politics of religion and state: The relatively comfortable, assimilated Jews of Victorian England espoused publicly in the *Jewish Chronicle* in 1875 the view that: "[t]here is only one theology in existence which is not antagonistic to science," gratifyingly (and somewhat conceitedly) setting themselves apart from Christian creationists; one hundred years later, the assimilation-fearful leading American ultra-Orthodox rabbi, Moshe Feinstein, on the other hand, hesitated little in calling his throngs of followers to "tear out those pages from the textbooks" which do not accord with a literal reading of the Bible. Perhaps most striking was the encounter of Jewish nationalism with the fruits of modern science: Rafi Falk shows in his chapter how a number of prominent Zionists conceived of their political enterprise in terms of safeguarding a Jewish race rapidly degenerating in a biologically untenable Diaspora. While it might be somewhat incongruous to read the great Jewish national poet Chaim Nachman Bialik bellying, "I too, like Hitler, believe in the power of the blood idea," it may perhaps not be all that surprising considering how, as Richard Weikart shows in his chapter, late-19th-century anti-Semites adapted their social Darwinism to argue for racial competition, and, eventually and tragically, racial extermination: Racially-sensitive Zionists simply took the anti-Semites' arguments and turned them on their head; if the Jews were weak and sickly, it was because they lacked a national homeland where they could work the land, outbreed amongst their scattered diasporas, and regain once again their racial strength. What provided justification for Jewish national dreams, such men believed, was the racial unity of all Jews the world over.

With further chapters on the teaching of evolution in modern-Orthodox high schools in the US



today, and on various attempts of accommodating evolutionary thought with religious creationist belief, *Jewish Tradition and the Challenge of Darwinism* will present the reader used to encountering the debates in an exclusively Christian context with an interesting counterpoint. Both the similarities and unique aspects of Christian and Jewish responses to Darwinism are instructive. It will be a much-welcomed result if this collection not only spurs further research into Jewish encounters with modern science and evolution, but also research into the encounters of other religions and systems of faith with modern science and evolution. As always, Darwinism can teach us much about the natural world; our own reactions to its powerful ideas can teach us no less about ourselves.

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THE EVOLUTION DIALOGUES

by Catherine Baker
edited by James B Miller
Washington DC: American
Association for the Advancement
of Science, 2006.
208 pages

Reviewed by Phina Borgeson

"Don't we need to just get back to the basics of intelligent design? Seems to me it's been identified with conservative evangelical Christianity, but it's really a religiously neutral theory isn't it?"

"Doesn't the account of creation in Genesis reflect the order in which things evolved, just not the literal timing?"

"Don't we want to encourage our children to understand the controversies around the theory of evolution? How else can they learn critical thinking? I have a friend at another church who thinks they ought to teach 'intelligent design' along with evolution in high school biology. What's wrong with that?"

"I think we need to consider

the feelings and the emotional motivations of people who reject evolution. Scientists act so superior. Shouldn't we be more concerned with economic and educational inequalities than with what scientists think?"

"I've been having some lengthy conversations with a man I trust and am feeling like everything I was taught in high school biology might be wrong. What about the Cambrian Explosion? And those moths in Britain?"

These are just samples of some of the questions I was asked during a recent round of speaking engagements in congregations. It seems that even when members of Christian churches accept evolution as a theoretical framework without which the life sciences would make no sense, they often have misconceptions about what evolution is and how science works.

While it is easy to begin to respond to such remarks on the spot, I find it impossible to provide the depth and breadth needed in the typical 45-minute between-the-Sunday-services forum. Until now, it seemed that only large congregations with scientists willing to teach an extended course on science and religion had the benefit of learning more about the nature of science, about the similarities and differences between the methods of science and theology, and about evolution as we hope it is taught in schools today.

The Evolution Dialogues offers a way for any congregation or study circle to engage the basics from both partners in the dialogue. Its reasonable price, attractive format and illustrations, and its glossary and tools, make it inviting for use with adults of all ages.

The book's modular nature means that it need not be engaged in its entirety, but can be read selectively to respond to local issues and individuals' dilemmas. Groups who enjoy discussion about particular situations or cases may want to use the fictional nar-

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rative of Angela Rawlett, a new college student from a conservative Christian background wanting to major in biology, as a springboard. Groups seeking information about a particular aspect may want to focus on a single chapter, for example, chapter 5 on "What Science Is." Study circles that want to know what all the fuss is about may focus on the even-numbered chapters, considering Christian perspectives and attitudes toward evolution. And it is also possible to focus on the odd-numbered chapters, reviewing the science, for those who want a succinct update on the history and present state of evolutionary science.

I find *The Evolution Dialogues* accessible and sound for its intended audience. I do, however, have a few quibbles. The even-numbered religion-centered chapters, left me, a Christian of liberal theology but traditional liturgical practice, not much finding myself in them. Others with a strong sacramental worldview might also detect a bias toward Protestantism, and especially toward a middle-of-the-road reformed theology. The definition of religion emphasizes inquiry and concepts; perhaps this seemed necessary to describe it as a dialogue partner of science. Theologically driven I may be, but I think that even among the most liberal and inquiring people of faith, religion is a lot more about identity and behavior, and less about ideas, than we are willing to admit.

More could have been offered on the different ways in which scripture is read and interpreted, since these often need clarifying both for those within Christian congregations, with their various approaches, and those who are looking in on faith communities trying to figure out just what is going on. In fact it was the references to scripture throughout the even-numbered thread where I tripped up. I wondered whether lay people whom I had led in studying the role and uses of scripture would not have questions, too.

I adopted the mind of an adult student of the role of the Bible in the even-numbered chapters, but I found myself reading the science chapters through the eyes of a high school biology student, like

the one I tutored this last school year. Some terminology did not seem in agreement with that used in recent high school biology texts. I found the omission of any mention of cladistics, for example, unfortunate, especially for the parents whose children will be encountering it. The discussion of speciation seemed oversimplified; I had to ask myself whether that was because the topic has been one of interest to me since I first met it in college. The answer was “not really” — every time I go on a nature hike it seems that questions related to species and their relationships are raised by those eager to learn, but with little academic background in the subject.

Suggestions for further study are a key aspect of any adult education course. I was disappointed that there were so few in the print volume, and that they were not expanded in the study guide to *The Evolution Dialogues* published on the AAAS's Dialogue on Science, Ethics, and Religion website (<http://www.aaas.org/spp/dser/images_Doser/Publications/evol_dialogue_study_guide.pdf>). I would have added more original historical material, such as *The Voyage of the Beagle*; a few good high school biology textbooks; and some popular treatments of evolutionary science, such as *Darwin's Dreampond* by Tijs Goldschmidt (Cambridge [MA]: MIT Press, 1996), for starters.

But these really are all quibbles, the sort of comments I make to a study group facilitator to whom I am recommending *The Evolution Dialogues*. Catherine Baker and Jim Miller, all the religious leaders and scientists who worked with them, and the staff of AAAS who supported the project are to be commended for tackling the challenge of introducing the conversation between Christianity and evolutionary biology in one crisp volume. Let it be an incentive to “teach the dialogue,” not the controversy.

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EVOLUTION AND CHRISTIAN FAITH: REFLECTIONS OF AN EVOLUTIONARY BIOLOGIST

by Joan Roughgarden
Washington DC: Island Press, 2006.
156 pages

**Reviewed by Charles F
Austerberry**

Many readers of books about evolution and Christianity assume that the two are incompatible, identify with only one or the other, but want to learn more about both. Writers proclaiming the compatibility of evolution and Christian faith therefore must provide at least two explanations: why evolution is good science, and why it is neutral or even friendly towards Christianity.

Some writers marking helpful boundaries between science and religion are not themselves Christians, including the late Stephen Jay Gould, Eugenie C Scott, and Michael Ruse. Christian biologists likewise emphasize those boundaries, but to them evolution is more than just compatible with Christianity — it significantly supports and enriches their faith. *Finding Darwin's God* by Kenneth R Miller (San Francisco: Cliff Street, 1999), *The Language of God* by Francis Collins (New York: Free Press, 2006), and *Darwin and Intelligent Design* by Francisco Ayala (Minneapolis: Fortress Press, 2006) all show how a professional biologist can incorporate evolutionary science within a Christian worldview.

To some extent, *Evolution and Christian Faith* by Joan Roughgarden is one of the latter. Roughgarden writes:

Our relationship to nature is not merely one of benevolent boss, it is one of love, because we are one body with nature ... the discovery that all of life is one body through its union into one

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family tree extends St Paul's teaching on Christian community to all of living creation. This finding is a source of joy, and I rejoice. (p 23)

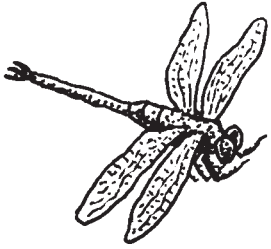
Miller, Collins, Ayala, and Roughgarden share other ideas too. All four are theistic evolutionists who reject “intelligent design” as special creationism. All four take the Bible seriously, but not always literally, and thus challenge some assumptions of fundamentalist Christians while generally fitting well within mainstream Protestant, Roman Catholic, and Orthodox Christianity.

Roughgarden's first goal is to help readers with little prior knowledge “come up to speed fast on today's incarnation of the controversy over teaching evolution” (p 6). She eschews both scientific and theological jargon, and does not even try to split certain theological hairs. For example, she does not favor any particular view of God's role in evolution, leaving that entirely to the reader: “It depends on whether you view God as highly involved in everyday, minute-by-minute events, or as setting the stage and then letting the plot unfold on its own” (p 47). Roughgarden covers the bare basics of both evolution and Bible interpretation in chapters 2–7. Chapter 8 (“Roman Catholic position”) discusses not only Cardinal Christoph Schönborn's July 2005 *New York Times* editorial but also the ensuing public debate through early 2006. The Dover, Pennsylvania, “intelligent design” trial (concluded in December 2005) and the El Tejon, California, creationism course (January 2006) are covered nicely in chapter 10 (“Intelligent design”), but the Kansas state science standards and the Cobb County, Georgia, textbook stickers are not mentioned.

So on the one hand, Roughgarden's short, accessible book achieves her first goal: to brief the uninitiated reader efficiently on evolution and Christianity. On the other hand, Roughgarden later tackles some difficult issues that probably matter little to the uninitiated. In chapters 9 (“To-do list for theorists”), 11 (“Gender and sexuality”), and 12



("Future directions"), she challenges two widely-accepted components of evolution, while also addressing one of the biggest controversies within mainstream Christianity today. Suddenly, Roughgarden's simple little book becomes vastly more complex! Does this compromise her first goal? Roughgarden thinks that to duck these issues would pose the greater risk:



I imagine an auditor who finds problems with the financial statement of a corporation must feel as I do. Is there merely some small slipup, or do we have a problem that might balloon someday, sending the company into bankruptcy? By fully disclosing the difficulties now, we avoid any later charges of a cover-up. (p 103)

Roughgarden first argues that cooperation is more important in evolution than is typically recognized:

The classic Darwinian narrative emphasizes individualism only and does not appreciate the multiple levels on which overall breeding success depends. This problem, called the "levels of selection" problem in biology, points to the poor job biologists are doing with understanding cooperation in nature. (p 74)

After a brief survey of cooperative phenomena, from animal social systems to cellular endosymbiosis, Roughgarden concludes:

Rethinking the place of individualism and the criteria for individuality in nature will produce an evolutionary biology having a different philosophical flavor from present-day neo-Darwinism. This will be an evolutionary biology of interdependency, a narrative that we are all of one body, and that furthers a vision of Christian community within nature. (p 78)

Roughgarden then condemns another aspect of evolutionary theory even more strongly:

The section of Darwin's writ-

ings that pertain to sex roles is called the theory of "sexual selection" ... This, to my knowledge, is the only part of Darwin's work that is so seriously incorrect that it cannot be updated or revised to make it right. (p 102-3)

Roughgarden describes sex-role reversal in seahorses, sex changing in coral reef fish, and homosexuality in various species. She concludes that "the factual case against the universality of the Darwinian sex roles is overwhelming and should be enough to falsify sexual selection theory on the spot" (p 111). Mainstream neo-Darwinian explanations of sex-role reversals and of the general fluidity and diversity of sexuality and gender — as exceptions that support rather than falsify sexual selection theory — are not discussed by Roughgarden.

Chapter 11 also has an extended analysis of biblical passages commonly interpreted by some Christians to condemn homosexuality. Roughgarden concludes that the Bible neither condemns nor endorses homosexuality. She notes that although homosexuality has always occurred, in biblical times it was not a category of personal identity "anymore than one's preference[s] for various colors or flavors are today" (p 123). References to eunuchs, on the other hand, are common in the Bible, and to Roughgarden they "support a much more inclusive welcome to persons of varying gender expression and sexuality than some denominations currently take as policy" (p 123).

I tend to agree with most of Roughgarden's arguments. Her criticisms of sexual selection theory itself are unconvincing, but she is probably right to question certain speculative applications of sexual selection theory to human behavior.

I also appreciate Roughgarden's admonition regarding the tone of the debate surrounding evolution education and religious faith:

We should welcome those who wish a peaceful dialogue, regardless of their history of dispute. It may be hard for people who are now

polarized not to think they are letting their side down by moving to the center, and it may be hard for those smitten by rhetoric to forgive, but this is what making peace takes. And I believe we do need to make peace so that we can move on to other issues. (p 132)

As examples of such other issues where biology and Christian faith interact, Roughgarden concludes with brief discussions of bioethics and care for the environment.

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DARWINISM AND ITS DISCONTENTS

by Michael Ruse
New York: Cambridge University Press, 2006. 316 pages

Reviewed by Doren A Recker

The purpose of Michael Ruse's newest book is to "defend Darwinism from false (or misguided) friends as well as from real enemies" (p 237). To this end he revisits themes he has addressed at book length in the past, including: (1) providing a historical context for Darwin's theory (1979, 2003); (2) demarcating the appropriate relations between science and religion (2001); and (3) evaluating debates among those who consider themselves to be Darwinians (1979, 2000). There is thus a considerable range of topics in this book, with chapters devoted to whether Darwinian evolution can be considered a "fact", whether there are constraints on the power of natural selection, and whether evolution needs to tread within religious waters, among other top-

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ics. Because of this breadth, *Darwinism and its Discontents* should prove useful to those familiar with any of these controversial topics, whatever their level or area of expertise. It may not be an easy read for novices, however, as Ruse moves too quickly for someone without at least some background in these debates. Still, he provides many references for each of the topics covered, and a substantial bibliography. So readers are guided to whatever background material they may need.

Can we meaningfully speak of the “fact” of evolution? Chapter two addresses this issue by distinguishing different senses of both “fact” and “theory” (for “fact”, consider the differences between “My car is green” and “The earth is in orbit around the sun”). Once simple observational descriptions are distinguished from inferences based on reliable evidence, there is no oddity or impropriety in labeling the evolution of organisms and their constituent parts a “fact”. “Judged against the kinds of criteria and practices that we normally apply and use when making inferences, the evidence for the fact of evolution is very, very solid” (p 45). Indeed it is.

Ruse reviews a representative sample of direct evidence for both human-directed organic change and examples from nature (dogs and hybrid corn/industrial melanism and resistance to insecticides), to show that there is good support for the *fact* of substantial organic change, as well as for “selection” (artificial or natural) being causally efficacious in the process. Then he (correctly) argues that the bulk of the evidence for Darwinian evolution is *indirect*, and based on *consilience* (explanatory power, especially involving data from a variety of areas or by continuing to seamlessly cover *new* data). This is a good chapter for use as an antidote against creationist and “intelligent design” advocates who use non-scientific senses of “fact” and “theory” to try to tag Darwinian evolution as “philosophy” or even “religion” (thus on a par with supernaturalism).

Two chapters (five and six) consider one of the hottest areas of controversy within evolutionary

biology, namely, is natural selection the only (or at least by far the predominant) cause of evolutionary change? Even non-specialists familiar only with the popular science literature will recognize echoes of this controversy associated with Stephen Jay Gould and Richard Dawkins (and their various supporters). To what extent can we assume adaptationism and/or optimality in our construction of evolutionary models? Do self-organizational, developmental, or structural *constraints* on functional characteristics of organisms shaped by natural selection limit its efficacy, or require additional explanatory models? Embedded within these general questions are issues such as (1) whether human-like intelligence was to be *expected* from the Darwinian process (or generally, whether “progress” is necessary or ubiquitous in evolutionary history); and (2) whether history and contingency or reverse-engineering and optimality provide better guides for understanding evolutionary processes.

To some extent intuitions here depend on what sort of *data* are taken as paradigmatic. If one stresses examples of arms races and cases that look very much like products of direct design, adaptationism and the ubiquity of selection may seem paramount. If instead one stresses “panda’s thumb” sorts of cases that are relatively clumsy (or due to contingent historical pathways instead of near-optimal solutions to design problems), internal and external constraints may seem to exercise more of a role. Ruse, I think, does a good job of steering between Charybdis and Scylla here, while favoring adaptationism and the use of optimality models, at least *methodologically*. He explains his preferences while backing away from more extreme claims that seem to deny legitimate evidence for historical and other constraints (which only fuel popular debates that have generated more heat than light).

Many will disagree with the details of his assessment, but, given the present state of controversy, that is to be expected. Ruse certainly doesn’t *settle* these issues here, but he does provide what I

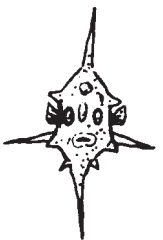
think is a reasonable and fair summary. Those not familiar with these issues could do much worse than beginning with these chapters. Those who are more knowledgeable (and/or partisan), will find a well-mannered and thoughtful treatment.

What about creationism and/or “intelligent design”? Here some readers might be a bit disappointed. While Ruse has weighed in on such issues through most of his professional career (see Ruse 1982, 2003, 2005), and has also participated in public debates and testified at trials, he says very little about “the enemy” in this book. To be sure, he shows clearly in chapter three that anyone opposing a basic evolutionary pattern in the fossil record or comparative anatomy or comparative molecular biology is not supported by the evidence from these areas. And in chapter twelve he makes it clear that *no* version of direct design can now hope to provide or supplement biological explanations (that is, natural theology has no scientific role to play), and takes a brief swipe at the bacterial flagellum totem that has become the icon of the intelligent design movement. On the other hand, this battle is not his major concern.

What he *does* say about evolution and religion in chapter twelve, however, is important. Characteristically, he distinguishes Darwinian evolution as *science* from *any* metaphysical position. Its authority extends to biological processes and structures, and no further. It simply cannot adjudicate issues concerning spirituality and the supernatural (though it can certainly exert its legitimate — and hard-earned — authority anywhere religiosity is extended to biological claims). This, too, is controversial, as anyone who has read Richard Dawkins’s *The God Delusion* (2006; the title says it all) can testify. Still, I find Ruse’s position both plausible and important, and well worth considering before weighing in on this issue (see also Ruse 2001, 2003).

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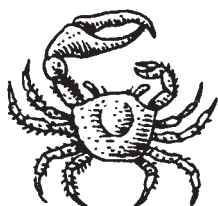
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THANK GOD FOR EVOLUTION! HOW THE MARRIAGE OF SCIENCE AND RELIGION WILL TRANSFORM YOUR LIFE AND OUR WORLD

by Michael Dowd
San Francisco: Council Oaks
Books, 2007. 352 pages

Reviewed by Clay Farris Naff

If all the things my mother taught me, two lessons really stuck. “Don’t talk about religion,” she warned. “And remember, you can’t please everyone.” Either Michael Dowd’s mother did not impart these views, or like so many of us wayward sons he chooses to ignore good maternal advice.

It is hard to fault Dowd, though, for he has such an appealing vision. In *Thank God for Evolution!* Dowd writes, “I foresee a day in the not-too-distant future when tens of millions of religious believers — Christian, Jewish, and Muslim alike — embrace the discoveries of science as public revelation, and in so doing become religious knowers.”

Dowd makes a worthy attempt to bring that day closer. In the opening pages of the book he promises the devout a God-glorifying experience, while to the atheist he pledges nothing that a scien-

tific purist could not endorse. Does he deliver? Not quite.

Raised a Roman Catholic, born again as an evolution-fearing evangelical, and reborn once again as a science-celebrating minister in the United Church of Christ, Dowd comes to his task with all the zeal of a convert. You have to admire the audaciousness of his effort to meld science and religion.

Take Creation. Pseudoscientific objections notwithstanding, creation stories are the chief reason why all too many people reject the scientific narrative. Above all, Scriptural literalists see evolution as the enemy of faith. For Dowd, however, Genesis and all the world’s other creation myths are just early drafts in the effort to jot down “The Great Story.”

“It is the 14-billion-year science-based tale of cosmic genesis. ... Science undoubtedly provides the foundation. For this tale to be experienced as holy, however, it must don the accoutrements of myth. Bare-bones science must be embellished with metaphor ... The Great Story seamlessly weaves together science, religion, and the needs of today’s world.”

The warp and woof of this seamless fabric are what Dowd terms “day language” — the terminology of facts, objectivity, and shared public experience — and “night language” — the stuff of metaphor, poetry, and image. With these, Dowd claims, the myths of old can be “creatively reinterpreted to mesh with the fruits of today’s science.”

How does this work? Look at what happens to the most important concept in Christianity: “The doctrine of salvation may be assisted by incorporating what I like to call evolutionary integrity, or deep integrity — integrity as Jesus taught by word and deed, but now set within the perspective of deep time — future as well as past.”

In short order, salvation has been transformed: “The Christian

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notion of being saved from eternal hellfire by grace through faith does make sense ... when seen in an evolutionary context. Freedom from the hell we create for ourselves through pride, arrogance, deception, resentments, hatred, and so forth is available only when we accept that some larger Wholeness is at work, and that this undeniable Reality is trustworthy and ultimately on our side.”

Dowd is relentlessly enthusiastic in defense of such propositions. On some pages, the exclamation points strike like summer lightning. While curmudgeons will recoil, Dowd’s voice may reach those to whom uplifting, liberal-minded sermons appeal. Let’s hope so anyway. The adaptation of theology to science is, as Hamlet might have put it, “a consummation devoutly to be wished”.

And no doubt some believers will indeed find Dowd’s recasting of creation and salvation satisfying. So what’s to kvetch about?

First, Dowd’s style seems likely to thwart his aim. Punctuation apart, some of his coinages make the reader wince. Admittedly, the standard term for the latest and greatest in brain evolution lacks charm, but calling the “prefrontal cortex” our “Higher Porpoise” is cute only once. Dowd pounds it home dozens of times, along with “Lizard Legacy”, “Furry Li’l Mammal”, and other bits of brain biology.

I suppose this kind of thing works well in a sermon, where conveying complex ideas in memorable fashion counts, but it swiftly grows tedious in a book. More to the point, for an author whose declared “life purpose” includes “evangelizing evolution”, it risks losing the very souls he seeks to save. Are religious conservatives likely to be attracted by terms that sound like the lyrics to a Raffi song? (And if that does not put them off, his gratuitous advice never to tip less than 20 percent and to ask sex partners for a rating on a scale of 1 to 10 surely will.)

There is a deeper problem with *Thank God for Evolution!* Having let go of scriptural literalism, Dowd has embraced a species of natural theology, and that biases

his worldview toward a benevolent teleology that science cannot support.

"Chaos, breakdowns, and difficulties are often God's greatest gifts," Dowd asserts, explaining that such events are "the primary driver of creativity and transformation — in our own lives as well as throughout the Cosmos." Fair enough, but he goes on to assert that having faith in God means "trusting that everything is right on schedule." So, when a freshman dies of meningitis in her college dorm, are her parents supposed to regard this as a planned gift from God? How is this an advance over the old platitudes of faith? And how can such assertions be squared with the fundamentally contingent, unplanned course of nature that science reveals.

The attempt to bind religious metaphors with scientific knowledge truly breaks down in Dowd's cosmology. He writes cheerfully of the ascending "arrow of progress ... moving through Creation since the beginning," but fails to note that like any arrow this one is describing an arc. He terms God the "Whole of Reality" but gives him personal attributes such as being the entity that "holds everything together."

Nice idea, but science informs us that our world, with its exquisitely balanced forces, its complex chemistry, and its astounding biology, is a sandcastle fated to be washed away by the tides of time. Reality is not on our side. Far from holding together, the universe is tearing itself into countless islands in an untraversable sea of ever-expanding space. In the end, entropy wins. Unless, of course, intelligent — dare I say divine? — intervention stays its clammy hand.

A commitment to science requires an unflinching acceptance of the evidence, good or bad. Though there is much to admire in his book, Dowd seems unprepared to grapple with the whole.

"This story has no end. Creation is ongoing," he concludes. Well, perhaps, but that is a matter of faith alone.

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BY DESIGN OR BY CHANCE? THE GROWING CONTROVERSY ON THE ORIGINS OF LIFE IN THE UNIVERSE

by Denyse O'Leary
Minneapolis (MN): Augsburg
Fortress, 2004. 384 pages

Reviewed by Phina Borgeson

Early in my career in religious education, a wise mentor advised me to always say three good things before I offered any negative criticism. I am ashamed that I cannot do that with O'Leary's book. Instead, the opinionated, ill-informed, and sometimes ridiculing tone of the afterword, as well as the unbalanced presentation in the body of the book, seems to call for a pull-no-punches response.

So that we have no hidden assumptions, let me say that I am a theist who has studied evolutionary biology. O'Leary defines "theistic evolution" as "Darwinism with a slight glow of faith" (p 240). Let's start there. "Darwinism" is not a theoretical framework in evolutionary biology, but a label applied by critics of a view of reality informed by the works of Charles Darwin and the Modern Synthesis.

O'Leary plays fast and loose with terminology throughout the volume. This may make for more interesting reading in journalism, which she claims her work to be, but it is unhelpful in dealing with the complex dialog between two disciplines — theology and evolutionary biology — each with its own extensive and precise vocabulary. Using pejorative labels external to a story and its context is not, I think, good journalism.

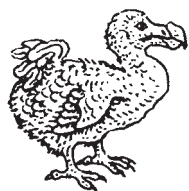
Theistic evolution covers a wide range of views arising from the interrelationship of the theology of divine creation and the evolutionary sciences. Some of these perspectives may have only a "slight glow of faith," but most seem to present an appreciation of divine creation deepened by understanding evolutionary processes. Very few of the spokespeople for theistic evolution are cited in O'Leary's work. She does discuss *Finding Darwin's God* by Kenneth Miller and the work of

Howard Van Till as examples of criticism of "intelligent design", and cites fellow Canadian Denis Lamoureux in passing, but only mentions other writers in the field in a brief footnote. In fact, she claims that her tradition, evangelical Anglicanism, has no interest or tradition in the field. Her Anglican theologian of note is CS Lewis — not exactly someone versed in contemporary science. I recommend for her reading the work of RJ "Sam" Berry in *God's Book of Works* (London: T&T Clark, 2003) or his work with Malcolm A Jeeves, *Science, Life and Christian Belief* (Grand Rapids [MI]: Baker Book House, 1998). If Anglicanism of another era is more to her liking, she could read further in Aubrey Moore, Charles Kingsley, and both Archbishops Temple (Frederick and William). If she would travel beyond the evangelical camp of Anglicanism, Arthur Peacocke and John Polkinghorne, both ordained scientists, have written on evolution and creation, and the younger generation, represented by Christopher Southgate, has some bracing things to say. Since writing *By Design or By Chance?*, O'Leary has apparently been received into the Catholic Church, which has its own rich theological traditions of ways of thinking about evolution, represented by John F Haught, Denis Edwards, Celia Deane-Drummond, and Elizabeth A Johnson; these, too, are overlooked in her book.

O'Leary's interpretation of what Darwin wrote would have been helped considerably by reading some John Hedley Brooke. In particular, his essay in "Revisiting Darwin on order and design" (in *Design and Disorder: Perspectives from Science and Theology*, Niels Henrik Gregersen and Ulf Gormann, editors, London: T&T Clark, 2002) would have served as a corrective to her chapter "Who was Darwin? What did he really say?" The fact is that O'Leary's notes reflect no research into

Phina Borgeson is a deacon in the Episcopal Church and a member of the Episcopal Committee on Science, Technology, and Faith. She was NCSE's Faith Network Project Director until 2004, and she continues to consult for NCSE.





Darwin's thought except through secondary and tertiary sources. The quotations from Darwin are ones most of us know by heart, even those of us who have only read the "intelligent design" literature.

I have been focusing on the theological background here, because O'Leary's book was published by a religious press, one whose sister house, Fortress Books, has a reputation for publishing volumes in science and theology that are comprehensively researched and connected to the traditions of the Christian community. Sadly, O'Leary's science reportage is no better informed than her theology.

Consider the table on p 98-9, "Some scientific objections to Darwinism". Anyone who has read writings of the Discovery Institute's fellows will recognize these variations on a theme that has been posed and refuted *ad nauseam*. The lengthy footnote to the table reveals that for all but two of the objections cited, the references are popular books. Of the remainder, one is substantiated by an article in a medical journal, another by an editorial in a scientific periodical. We might have expected this. After all, "objections" is a courtroom term, not a scientific one.

I do recommend reading the afterword. It not only expresses O'Leary's opinions, it confirms her abundant lack of understanding. It makes clear that she does not know how a theory works in science. Such sentences as "If the Darwinist is determined that natural selection is the only possible mechanism for the development of life ..." reveal that she has not grasped that modern evolutionary theory is really a complex of theories. It is a pity that the only contributor to the modern synthesis she seems to have read is Julian Huxley, and that because he helped to found the American Humanist Association. Any of Ernst Mayr's writings on evolutionary theory would have been a big help.

Reading the next-to-last section in the author's afterword ("On intelligent design") and her opinion "The current intelligent design controversy is a struggle within science ..." reveals the basic flaw in

the book. If there is a controversy, it is not within science as science is practiced; it is over the nature of science, which "intelligent design" proponents would have include the supernatural. Her unabashed advocacy for this major change places O'Leary's work in the category of polemic, not the journalistic account it claims to be.

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ORIGINAL SELFISHNESS: ORIGINAL SIN AND EVIL IN THE LIGHT OF EVOLUTION

by Daryl P Domning, foreword
and commentary by
Monika K Hellwig
Aldershot (UK): Ashgate, 2006. 191
pages

Reviewed by Patricia A Williams

Original *Selfishness* provides an excellent reason for teaching about evolution. It introduces a new intellectual field, evolutionary theology. Although undefined in the book, evolutionary theology explores the contribution the theory of evolution, broadly considered, can make to Christian theology and our understanding of the Bible. However, theology is only one area where evolution increasingly has influence. It is employed elsewhere in the humanities and in non-biological sciences including psychology, anthropology, sociology, economics, computer science, and materials science. By the time current school students reach college, they will need to know the theory to understand ideas in many subjects, including literary criticism.

Dayrl P Domning, a paleontologist, hopes to contribute to theology as a scientist by showing that the Christian doctrine of original sin is empirically verified. However, Domning also makes claims extending far beyond science. He intends to show the compatibility of both the Bible and Christianity with science. His scientific contribution is important

and, in broad outline, well-argued, if not quite original. Moreover, the book reflects honest struggle, wide learning, and a clear understanding that evolution affects theology. (Monika K Hellwig was a Catholic theologian whose contribution to the book is slight and unhelpful.)

Domning argues that all organisms must act to preserve and perpetuate themselves. Those failing to do so died individually and went extinct collectively. Therefore, all organisms that survive and reproduce necessarily act for selfish ends. Thus the title of his book, *Original Selfishness* — the selfishness inherent in organisms since the emergence of life on earth. Further, he claims that selfishness is the only orientation throughout the organic world. This selfishness is not sinful, but amoral or even good until evolution generates human beings. Then, actual sinning begins.

Sinning begins with us because our unique self-consciousness makes us aware, as other organisms are not, of the claims of other selves. Yet we disregard or obstruct others' claims. In doing so, we commit actual sins. In contrast, original sin is the necessarily selfish orientation found throughout the organic world.

Thus, as Domning correctly claims, the theory of evolution relieves Adam and Eve — humanity in general — of responsibility for the origin of sin. Instead, original sin is a natural feature of life from its beginning, and we participate in it along with all other organisms. We are responsible only for those sins we ourselves commit.

This is Domning's scientific contribution. However, he seems not to understand the implications for theology. In Christian theology, most doctrines of the atonement rest on the historicity of Adam and

Patricia A Williams is a philosopher of biology and philosophical theologian. She is the author of several books including Doing without Adam and Eve: Sociobiology and Original Sin, Where Christianity Went Wrong, When, and What You Can Do About It, and Revealing God: A New Theology from Science and Jesus (forthcoming). Her website is <www.theologyauthor.com>.

Eve. 1 Corinthians perhaps says it best: “For as all die in Adam, so all will be made alive in Christ” (15:22, NRSV). Adam is at fault. His sin angers God, and Jesus allays God’s anger — or Adam offends God’s justice until Jesus, substituting for us, satisfies it — or Adam sells humanity to the devil until Jesus redeems us. (There are a dozen different doctrines of the atonement; no one has figured out to everyone’s satisfaction what Jesus did.) Once the atonement becomes a meaningless doctrine, as it does in Domning’s construction of original sin, Jesus merely provides an example for humanity to follow. But, then, why follow Jesus? Why not Gandhi, about whom we know far more?

Perhaps worse, if evolution makes us completely selfish, we are incapable of following Jesus’s example, which, Domning relates, is one of unreserved selflessness. Where would we get the capacity? In the Catholic theology Domning supports, grace builds on nature, but with unmitigated selfishness natural, grace lacks a foundation upon which to build. The Protestant theologian John Calvin would have God replace our nature, but presumably not while we are on earth.

Fortunately for the logic of Domning’s argument, he gets the science wrong only here. And without excuse, for he has read the

relevant literature. He knows the distinction philosopher Elliott Sober makes between “evolutionary selfishness ... , psychological (conscious) selfishness, and psychological selfishness that disregards the needs of others” (p 117). Evolutionary selfishness is merely (in Domning’s own words) “the innate imperative to perpetuate and benefit oneself” (p 183). Conscious selfishness cries, “That’s for me!” whereas disregarding others means ignoring or harming them to get one’s way.

Furthermore, evolutionary selfishness encompasses evolutionary altruism, defined as behavior that reduces the actor’s chances of surviving to reproduce while enhancing another’s opportunities of surviving to reproduce — frequent in nature among close kin, and hardly self-serving. In addition, recent work on competition discerns several types, some altruistic, some selfish, some self-serving only in helping one’s own group. Even the classical self-centered “economic man” was too simplistic and has been rehabilitated to be concerned also with fairness, reciprocity, and justice.

As might be expected, knowledge of the Bible is not Domning’s strong suit. Except for the narrative about Adam and Eve, he takes the Bible much too literally. More than once, he says “God called creation good.” Properly, “Genesis 1

reports that God called creation good.” A great gulf of skepticism is fixed between the two statements. Through a secondary source (GE Mendenhall), he also reiterates Julius Wellhausen’s anti-Semitic and much discredited portrayal of the history of Judaism.

Domning should have consulted a biblical scholar rather than a theologian. The theologian he consulted (Hellwig) undermines the main thesis of his book by asserting that origins are irrelevant to redemption. Orthodox Christian theologians must either revise their theology or promulgate such deceptions. Hellwig’s assertion is clearly false, as Domning’s argument demonstrates.

Evolutionary theology is an infant field. The best of contributors will make mistakes; some will follow wrong paths before turning back; others will never know they have gone wrong. Domning’s book contains errors, but he has worked hard and honestly. Moreover, his main thesis of the origin of original sin (selfishness) in the processes of evolution is strong and cogent. He provides an important contribution to an immature intellectual province. His offering will help it mature.

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This billboard in Lancaster County, Pennsylvania, caught the eye of Dennis Evangelista as he drove west across the Keystone State. Sight & Sound Theatres produces programs in Strasburg, Pennsylvania, and Branson, Missouri, “to visualize and dramatize biblical truth through live stage productions — to illustrate truth in the same way that Jesus did, by storytelling.”

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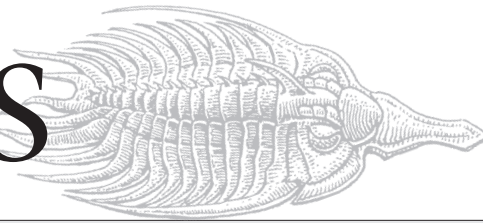
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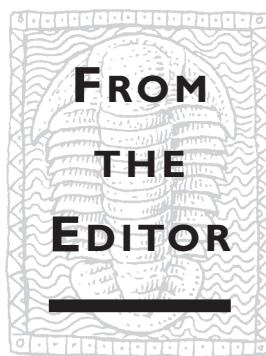
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Grand Canyon National Park
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explore his website at <www.trollart.com>.



Despite a continuing string of setbacks in legal, political, and educational settings “intelligent design” and its advocates soldier on. This issue of *RNCSE* explores recent manifestations of ID — illustrating both its rapid rate of mutation in the face of its low fitness (in terms of scientific fecundity) and its deep roots in the religious anti-evolutionism that produced creation science.

Despite its ignominious defeat in Dover, ID has not slunk off to lick its wounds. The euphemisms have changed again, but the ID proponents keep pressing the attack. Joe Felsenstein examines William Dembski's ideas about specified complexity and “conservation of information” in his article. The fatal problem with Dembski's arguments for evolution, he says, is that selection is not random and that the specification in natural selection is not *information*, but *fitness*.

ERRATA

In Joseph Lazio's “How does the sun shine?” (*RNCSE* 2006 Sep/Oct; 26 [5]), the masses in the comparison of helium and hydrogen atoms (p 31) were incorrect. The sentence should read: “One helium atom has a mass of 6.648×10^{-24} g while four hydrogen atoms have a mass of 6.694×10^{-24} g.”

On p 25 of *RNCSE* 2006 Nov/Dec; 26 (6), the title of Andrew J Petto and Laurie R Godfrey's new anthology was given as *Scientists Confront Creationism and Intelligent Design*; the title is in fact *Scientists Confront Intelligent Design and Creationism* (it is, of course, hard to tell the difference between the two). WW Norton has announced that the paperback edition will revert to the original title with a twist: *Scientists Confront Creationism: Intelligent Design and Beyond*.

The Culture Shocks show on which NCSE's Eugenie C Scott appeared was #805, not #809 as reported in “News from the membership” (*RNCSE* 2006 Nov/Dec; 26 [6]: 12-14). It is available on-line at <<http://www.cultureshocks.com/archives.html>>.

Turning to the classroom, Jason Borenstein shows that examining ID arguments as serious propositions exposes their weaknesses ... but only if students have proper scientific background. In this case, taking up the “teach the controversy” challenge will expose the scientific bankruptcy of the “evidence against” evolution.

Jack Keyes and Nancy Broshot have taken up Borenstein's challenge after a fashion. They provide a course in basic scientific literacy that allows students to grapple with the evidence that supports scientific ideas and to understand the nature and practice of scientific inquiry.

Finally, Mark Perakh looks in vain for a dialog between ID supporters and the rest of the scientific community. Pointed critiques of Dembski's proposals are mainly unanswered.

THE CANYON IS STILL GRAND!

In a special section, we have three items on the Grand Canyon. Genie Scott fills us in on the 2007 NCSE “two-model” raft excursion in the Canyon. Glenn Branch and Wesley Elsberry report on several aspects of the controversial sale of *Grand Canyon: A Different View* in book stores within the park. That this issue is still unresolved after more than four years is itself an issue.

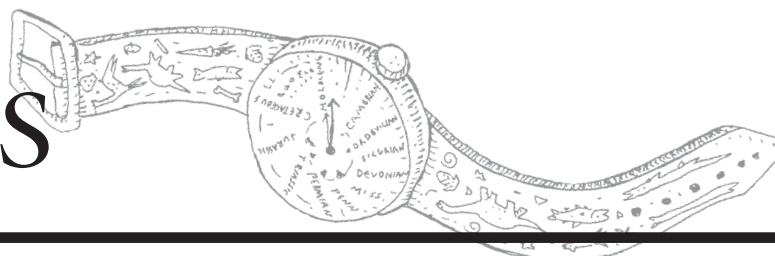
BOOKS TO CONSIDER

There have been so many new books relevant to the public understanding and support of evolution and science that we once again have expanded this issue into a double issue to accommodate the reviews that have been pouring in.

Randy Olson and Lauri Lebo review two of the books on the Dover trial. William Patterson and Aubrey Manning review biographies of two prominent scientists in the development of our modern understanding of the history of the earth and the biological variation of living things on the planet.

Finn Pond's review of *Darwin in the Genome* shows that our understanding of the nature of the genome and genetic change is still evolving. The more we study, the more we learn.

RNCSE 27 (3-4) was printed in November 2007.



The ICR Moves to Dallas

The Institute for Creation Research (ICR) announced recently that it had relocated its headquarters to a new campus in Texas. In the August 2007 issue of *Acts & Facts* (available on-line at <<http://static.icr.org/pdf/af/af0708.pdf>>), Henry Morris III wrote:

[I]n order to expand ICR's efforts in research, education, and dissemination, we recognize the need to recruit and train the next generation of creation scientists who will develop the mission for generations to come. To accomplish that vital objective, and to fulfill the international ministry opportunities the Lord has opened for us, the board of directors authorized the relocation of ICR to the new Dallas campus, with most of the operations to be in place by the end of this year. (p 9)

Morris also pointed to the high cost of operations in southern California as a factor in the decision, explaining that donors' contributions will go further and produce more in the new location.

ICR museum will remain in Santee, California (near San Diego) with some staff and researchers, but Morris announced the relocation of most of the other operations:

All new science and professional staff will be recruited and located at the new Dallas campus. The Graduate School will also relocate to Texas, as much of the new educational emphasis is now online, with a new MS

degree program in Science Education already underway. ICR's online Creationist Worldview study program, launched in January 2007, continues to add new students each month. The new facilities in Dallas will also expand the life sciences laboratories to facilitate the GENE project, housing two electron microscopes, computer labs, large classrooms, as well as additional offices for new faculty. *Acts & Facts* readers and other friends of ICR will be kept abreast of the relocation process over the next few months. (p 9)

The move is expected to be complete by the end of 2007.

[Thanks to John R Cole for alerting us to the news.]

Workshop on Teaching Evolution at the University of Colorado

Sarah Wise and Matt Young

For the second year, Sarah Wise, Mike Robeson, and Cathy Russell of the University of Colorado, Boulder's Science Discovery Unit have organized a workshop on "Teaching Evolution: Meeting the Challenge" at the University of Colorado, Boulder. The program was aimed at college and public school teachers, including elementary school teachers. The workshop's purpose was to "feature a full day of practical one-hour workshops and panel discussions on Teaching Evolution, interspersed with opportunities to interact informally with other par-

ticipants." During the workshop, resources relating to teaching evolution were displayed in common areas, and many are available for download at the event website (see sidebar, p 5).

Approximately 70 people attended the workshop. Of those, about 50% were high-school teachers; 15% were teachers from middle or elementary levels; 25% were university faculty, staff, or students; and 10% were from other scientific organizations such as the Denver Zoo and the Boulder Open Space Department. In a survey given in conjunction with the workshop, 57% of respondents reported that they self-censor their teaching of evolution to some degree and/or receive pressure to avoid teaching evolution from their school or community. This figure was highest among middle-school teachers (86%) and informal educators (62%), while the incidence among high school teachers was lowest (33%).

For those interested in organizing and holding similar events,

Sarah Wise is a PhD candidate in the Department of Ecology and Evolutionary Biology at the University of Colorado, Boulder, where she investigates the evolution and development of teeth. She has her MEd from San Francisco State University. Her outreach work with teachers was supported by a fellowship from the NSF's GK12 program.

Matt Young is Senior Lecturer in Physics at the Colorado School of Mines and formerly a physicist with the National Institute of Standards and Technology. He is President of Colorado Citizens for Science and Senior Fellow with the Jefferson Center for Science and Religion. With Taner Edis he coedited Why Intelligent Design Fails: A Scientific Critique of the New Creationism (New Brunswick [NJ]: Rutgers University Press, 2004).



RESOURCES FROM THE COLORADO TEACHERS' WORKSHOP

Interested readers may find information on the workshop here: <http://www.colorado.edu/eeb/EEBprojects/teaching/workshops.html>.

Many of the materials that were presented at the workshop can be viewed here: <http://www.colorado.edu/eeb/EEBprojects/teaching/workshopresources.html>.

A report on the outcome of the workshop is posted here: http://www.pandasthumb.org/archives/2006/06/symposium_on_te.html.

Matt Young interviewed organizer Sarah Wise about the workshop.

Matt Young: *What gave you the initial idea to hold a workshop like this one?*

Sarah Wise: I attended a lecture by Patty Limerick, a well-known historian and the director of the University of Colorado's Center of the American West. She and her colleagues hold forums on controversial issues in the West, providing information that help the public gain perspective on those issues. While her group hadn't ever focused on evolution, her example inspired me to take action and provided a model for me to work from.

How did you get funding for the workshop?

The first workshop, which was a half-day, was funded by the Department of Ecology and Evolutionary Biology, an NSF-funded University of Colorado GK12 program, and the Colorado Citizens for Science. This year nearly all of the funding came from the University's United Government of Graduate Students (UGGS), which contributed \$750 through its regular event-funding program. The EEB department graciously bailed us

out when we had a cost overrun, however. We also received generous donations from Qdoba, Izze, and a local bakery, which we acknowledged during the introductory remarks and in the program.

The all-day workshop cost about \$1000, not counting donations. This included \$160 for breakfast, \$530 for lunch, \$210 for photocopies, and \$100 for other office supplies. We did not charge a registration fee specifically in order to maximize access for teachers.

How did you motivate your department to get involved?

I didn't have to work too hard at that — our department chair had been involved in the first year's event, so he was very supportive and readily agreed to cover expense overruns, let me use the department copier, and obtained the assistance of our office staff. The staff was essential in getting the copying done, lunch set up and cleaned up, and the website designed and uploaded with content. It was easy to use our e-mail listserv to recruit other graduate students to help on the day of the event. A team of graduate students has organized to plan next summer's event, so I can now move into an advisory role.

How did you arrange academic credit and CDE (Colorado Department of Education) credit?

To maintain their certification, teachers have to earn a certain number of professional development credits. Additionally, some teachers can get a salary increase if they earn college credits. We arranged for participating teachers to earn college credit, at a minimal cost, if they requested it. Alternatively, teachers could apply to receive professional development credit from the CDE at no cost.

Arranging for these credit incentives was easy. The Biological Sciences Initiative at the University has an arrangement with the continuing education department at the Colorado School of Mines, so it was a simple matter to arrange college credit through CSM. The CDE required me to submit a form for each participant and to ensure that those participants had actually attended all 7.5 hours of the work-

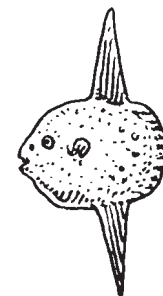
shop, so I circulated a sign-up sheet at each session and cross-checked it with an attendance form that each participant filled out at the end of the event.

You had 16 presenters, counting the panelists. How hard was it to find presenters?

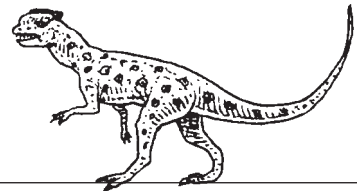
I was pleasantly surprised by the variety and quality of presenters who made their way to me. The 16 educators who presented came from a network of nearly 30 interested parties. The most significant of these was the participant list from the original half-day event, which I used to make a call for proposals. A few others contacted me after I posted the same announcement on a listserv for Colorado science educators. I met others by attending various area lectures and events having to do with evolution. Being connected to the university was very helpful overall in organizing presenters, since 15 of the potential presenters were affiliated with CU as a former student, current student, or faculty member.

You held the workshop on a Monday shortly after school was out. Why during the summer?

It was not possible to reserve the university lecture hall and other rooms during the academic year. I also wanted to avoid times of the school year when teachers are under a lot of pressure. The weekend was an option for reserving rooms at the university. I had been told, however, that weekend events are fairly unpopular with teachers, and they are definitely unpopular with university people. I considered a Monday holiday but found through an e-mail survey that holidays were also unpopular with teachers. I think the week after school gets out is good, and the week before school starts again may be even better. Of course, scheduling is complicated by the fact that school districts have different starting and ending dates. On the other hand, I have also been told that you get more no-shows in the summer than on school-year Saturdays. This year we had 30 no-shows, which was disappointing. If we do a summer event next year, we'll overbook a few to avoid this problem.



UPDATES



Colorado, Boulder: Threatening notes were e-mailed to and left at laboratories in the Ecology and Evolutionary Biology Department on the University of Colorado, Boulder, campus in early July 2007. The *Denver Post* (2007 Jul 10) reported, "The messages included the name of a religious-themed group and addressed the debate between evolution and creationism," and quoted a campus police officer as saying, "There were no overt threats to anybody specifically by name ... It basically said anybody who doesn't believe in our religious belief is wrong and should be taken care of." A report in the *Colorado Daily* (2007 Jul 16) added the details that the notes were "marked with skull and crossbones" and compared biology professors to child molesters. Police are investigating, and have increased their patrols in and around the science buildings on campus. The chief suspect is reportedly a Messianic Jew named Michael Korn. Jeffrey B Mitton, the chair of the university's Department of Ecology and Evolutionary Biology, told *Wired News* (2007 Jul 17) that Korn's "picture has been circulated on flyers saying: 'If you see this guy dial this number'" but added that it was his understanding that Korn and his wife left the Boulder area suddenly.

Florida, Palm Beach County: A local parent's censorship effort was frustrated when the Palm Beach County School Board voted unanimously on July 11, 2007, to deny her request to remove eighty books discussing what she regards as objectionable topics from the school libraries in the Palm Beach County schools (*South Florida Sun-Sentinel* 2007 Jul 12). Although Laura Lopez objected primarily to books discussing homosexuality, abortion, and atheism, the *Palm Beach Post* mentioned evolution as among her targets (2007 Jul 21), and a columnist for the same newspaper wrote, "Oh, and another thing, she's sick and tired of the public schools for spreading all that nonsense about The Big Bang theory, because as she says, 'the world was created 6000 years ago.' I agree with her that the public schools are very light in their teaching of those early days when people were *Tyrannosaurus* food. And if that's your issue — making sure that your children learn that the collected wisdom of science is dead wrong — then public schools are in regrettable shape" (2007 Jul 18). Lopez's request was denied by two schools and by the superintendent of the school system before it reached the school board; she plans to return with a petition supporting her request and to explore

the possibility of taking legal action with the American Center for Law and Justice (*Boca Raton News* 2007 Jul 13).

Kentucky: Answers in Genesis's Creation Museum continues to spark controversy. Noting that the Northern Kentucky Convention and Visitors Bureau's website describes the museum as aiming to "counter evolutionary natural history museums that turn countless minds against Christ and Scripture," Daniel Phelps, the president of the Kentucky Paleontological Society, protested the inflammatory description. His protests were ignored by the agency until the story was broken in the media. Phelps told the *Cincinnati Enquirer* (2007 Aug 26) that it was inappropriate for the tax-supported tourism agency to express such a view. "There's many people who are very religious, and they don't have a problem with evolution," he added. "If the creationists want to say things like that on their own Web site, that's their business."

A spokesperson for the agency told the *Enquirer* that the language was taken from Answers in Genesis, explaining, "We simply provide a listing and description on the Web site as a service to them," but declined to comment on whether the agency would



And, finally, what may be the big question for some: How much time did you spend?

About 80 hours during the semester, 40 in the last week before the workshop, and about 20 hours in follow-up work such as arranging for credit and assembling data. Other grad students spent about 40 hours altogether, but most of that was the day of the workshop, unless they were presenters. Presenting, by the way, is an excellent opportunity for a grad student to get some experience.

Any further advice for people who want to organize a series of workshops of their own?

Carpe diem! If this appeals to you, there's no reason to delay action. There will always be pressures on your time, and the issue is perennially controversial. On the other hand, just a few e-mails are likely to net you some committed, passionate helpers. Don't be shy about asking for help from local businesses, universities, and museums. I am willing to answer questions any time;

just e-mail me at findbliss@hotmail.com.

We have high hopes that this workshop will be repeated annually and further that it will be emulated in other states and at other universities.

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consider revising the description of the Creation museum. Phelps responded, "It's a local attraction, and they should be listed on their Web site ... But they don't need to say anything negative about a regular natural-history museum, and I just was amazed." A spokesperson for Answers in Genesis defended both the agency's use of the ministry's description of the museum and the accuracy of the description itself, saying that natural history museums indeed turn countless minds against the Bible "when they present an evolutionary view that's in contrast with what the Bible says."

Shortly after the *Enquirer* broke the story, the Northern Kentucky Convention and Visitors Bureau quietly revised its website to provide a less inflammatory description of the museum, which is now described as offering "[a] walk through history via the pages of the Bible — exploring how scripture provides an eyewitness account of the beginning of all things." Phelps told the *Enquirer* (2007 Sep 1), "Well, at least it's not inflammatory ... I worry about separation of church and state, but at the same time, it is a local tourist attraction, so it's probably not something we should be concerned about anymore." Neither representatives of the tourism agency nor spokespersons for Answers in Genesis were available for comment, the *Enquirer* reported.

Massachusetts: In a recent op-ed in the *Boston Globe* (2007 Aug 9), Sally Lehrman discussed the challenges confronting evolution education even in Massachusetts, a state not conspicuous for its level of anti-evolution activity. "A well-thought-out curriculum in science does not guarantee that evolution will be taught in all its glory — or even coherently," she observed, noting that science teachers often express a lack of confidence in their knowledge of evolution (as the AAAS's president Gilbert S. Omenn reported in 2006; see his report available on-line via <<http://www.aaas.org/programs/centers/pe/evoline/>>) and that in Massachusetts, teachers licensed for biology are not required to have taken a course on evolution.

Massachusetts's science stan-

dards received a grade of A from the Fordham Foundation in 2005, and its treatment of evolution received a score of 3/3, with the comment, "Especially impressive for instruction in biological diversity and evolution is the recently posted high school material, free as it is of common errors and glosses." But Lehrman observes, "Some teachers assign their evolution module a slot at the end of the year, then run out of time. Some speed right through it," for, as NCSE's Education Project Director Louise Mead told her, "The state standards say nothing about what goes on in the classroom."

Complicating the situation even in Massachusetts are the efforts of creationists. Lehrman notes the very latest tactic: "A new high-school textbook from the Discovery Institute, *Explore Evolution*, claims to teach students critical thinking but instead uses pseudoscience to attack Darwin's theories." (For a preliminary assessment, see *RNCSE* 2006 Nov/Dec; 26 [6]: 15-16.) And she adds, "The National Center for Science Education, which tracks trends in schools, has compiled a frightening list of bills and local proposals intended to open the door for creationist teaching in science education."

Texas: On July 17, 2007, Don McLeroy was appointed by Texas governor Rick Perry (R) to chair the state board of education, succeeding Geraldine Miller. A member of the board for the last eight years, McLeroy was described by the *Dallas Morning News* (2007 Jul 18) as "aligned with social conservative groups known for their strong stands on evolution, sexual abstinence and other heated topics covered in textbooks" and as "[o]ne of four board members who voted against current high school biology books because of their failure to list weaknesses in the theory of evolution."

In a statement issued on July 17, 2007, Texas Freedom Network's president Kathy Miller chided Governor Perry for his choice, writing, "Texas parents should be troubled that the governor has appointed as head of the state board a clear ideologue who has repeatedly put his own personal and political agendas ahead of sound science, good health and

solid textbooks for students. Even worse, Mr McLeroy will now be in charge of the board's scheduled revision of the state's science curriculum standards, an area where he has already cast his lot with extremists who want to censor what our schoolchildren learn."

The state's newspapers also expressed concern about McLeroy. Referring to previous ideological struggles in which the board was involved, the *Dallas Morning News* (2007 Jul 19) worried, "The elevation of veteran board member Don McLeroy to the chairman's post raises concerns that the board is headed back in that direction," and urged McLeroy to steer clear of "the bitterness of past culture wars." Similarly, the *Austin American-Statesman* (2007 Jul 22) commented, "McLeroy's elevation to chairman comes as the board begins a revision of science standards for public schools. That could prove embarrassing for Texas if McLeroy pushes for standards that push theology over science."

A document on McLeroy's personal website entitled "Historical Reality" (<http://www.donmcleroy.com/Textbooks/Historical_Reality.htm>) and dated September 8, 2003, offers a glimpse of McLeroy's understanding of evolutionary science. Relying on discredited sources as Michael Behe's *Darwin's Black Box*, Jonathan Wells's *Icons of Evolution* and Percival Davis and Dean Kenyon's *Of Pandas and People* as well as on tendentious misreadings of legitimate science and on long-ago-debunked creationist claims, McLeroy there argued that common descent is "only a hypothesis, and a shaky one at that." He then urged his colleagues on the board to reject the books then under consideration — a plea that was ultimately ignored.

McLeroy's views on evolution were again in the news after the Texas Freedom Network accused him, in a press release dated August 7, 2007, of harboring "a shocking hostility to both sound science education and religious tolerance." TFN's charge was based on the transcript of a 2005 talk McLeroy gave at Grace Bible Church in Bryan, Texas, on the debate over teaching evolution and "intelligent design". "This recording makes



clear the very real danger that Texas schoolchildren may soon be learning more about the religious beliefs of politicians than about sound science in their biology classes,” TFN President Kathy Miller said.

Discussing his 2003 vote against high school biology books because of their failure to list supposed weaknesses in evolutionary theory, McLeroy lamented that the other board members were not swayed by “all the arguments made by all the ‘intelligent design’ group[s], all the creationist ‘intelligent design’ people,” adding, “It was only the four really conservative, orthodox Christians on the board [who] were willing to stand up to the textbooks and say they don’t present the weaknesses of evolution. Amazing.” TFN’s Kathy Miller observed, “[I]t appears that Don McLeroy believes anyone who disagrees with him can’t be a true Christian.”

Following Phillip Johnson, McLeroy portrayed “intelligent design” as a “big tent” in his talk, explaining, “It’s because we’re all lined up against the fact that naturalism, that nature is all there is. Whether you’re a progressive creationist, recent creationist, young earth, old earth, it’s all in the tent of ‘intelligent design.’” He urged his listeners, biblical inerrantists like himself, “to remember, though, that the entire ‘intelligent design’ movement as a whole is a bigger tent. ... just don’t waste our time arguing with each other about some of the, all of the side issues.” Yet he described theistic evolution — which is opposed to naturalism as he defined it — as “a very poor option,” continuing, “no one in our group represents theistic evolution, and the big tent of intelligent design does not include theistic evolutionists. Because intelligent design is opposed to evolution. Theistic evolutionists embrace it.”

“McLeroy’s statements during his lecture are particularly insulting to Roman Catholics and millions of other Christians who see no conflict between their religious faith and accepting the science behind evolution,” TFN’s Kathy Miller commented. “He might as well have put up a sign that said, ‘Only my kind of Christian need

apply.’” Texans are currently bracing for a new round of anti-evolution activity aimed at undermining the treatment of evolution in the state science standards (the Texas Essential Knowledge and Skills, or TEKS), to which textbooks submitted for adoption in Texas are required to conform.

National: Despite the worries expressed by pro-science activists in Ohio, Kansas, and elsewhere, Ken Willard was elected to the position of president-elect of the National Association of State Boards of Education in July 2007. According to a July 13, 2007, press release from NASBE, “Willard will begin his term of office in January 2008 and then serve as president of the association in the following year.” The only other candidate for the position withdrew for personal reasons; there were efforts among pro-science activists to run a write-in campaign, although there is no provision for write-in votes in NASBE’s by-laws. It was Willard’s service on the Kansas state board of education that provoked concern: Jack Krebs of Kansas Citizens for Science told the *Lawrence Journal-World* (2007 May 23) that Willard’s advocacy for “intelligent design” was not the only worrying aspect of his candidacy. (For background, see *RNCSE* 2007 Jan-Apr; 27 [1-2]: 4-9.)

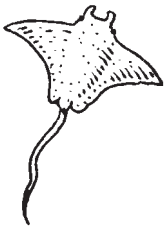
National: *The Atlas of Creation*, a massive volume by the pseudonymous Islamic creationist Harun Yahya distributed throughout Europe in early 2007, is now being circulated to scientists in the United States. *The New York Times* (2007 Jul 17) reported that copies of the book are “turning up, unsolicited, in mailboxes of scientists around the country and members of Congress, and at science museums in places like Queens and Bemidji, Minnesota. At 11 x 17 inches and 12 pounds, with a bright red cover and almost 800 glossy pages, most of them lavishly illustrated, *Atlas of Creation* is probably the largest and most beautiful creationist challenge yet to Darwin’s theory, which Mr Yahya calls a feeble and perverted ideology contradicted by the Koran.”

Among the recipients were University of California, Berkeley,

paleontologist Kevin Padian (who serves as president of NCSE’s board of directors) and Brown University cell biologist Kenneth R Miller (a Supporter of NCSE). Both marveled at the production values of the *Atlas*, with Miller estimating that such a book would cost at least \$100 in a retail bookstore, but both were dismissive of its content, with Padian commenting that Harun Yahya “does not really have any sense of what we know about how things change through time.” Padian added that he thought that the distribution of the *Atlas* would have little effect in the United States: “We are used to books that are totally wrongheaded about science and confuse science and religion.”

It is unclear how the recipients were chosen. The *Times* noted the irony that Padian and Miller, who served as expert witnesses for the plaintiffs in *Kitzmiller v Dover*, in which teaching “intelligent design” creationism in the public schools was ruled to be unconstitutional, were on the list, as was Ohio State University biologist Steve Risling (a member of NCSE), a long-time defender of education evolution. It is also unclear how the campaign is funded. Truman State University physicist Taner Edis (a member of NCSE), author of the recent book *An Illusion of Harmony: Science and Religion in Islam* (Amherst [NY]: Prometheus Books, 2007), told the *Times* that Harun Yahya’s activities are generally described in the Turkish press as funded by “donations,” adding, “But what that can mean is anybody’s guess.”

Toward the end of the article, the *Times*’s reporter wrote, “As the scientists ponder what to do with the book — for many, it is too beautiful for the trash bin but too erroneous for their shelves — they also speculate about the motives of its distributors.” (The *Times* was unable to reach the shipper; the publisher, Global Publishing of Istanbul; or Harun Yahya himself.) NCSE’s executive director Eugenie C Scott commented, “My hypothesis is, like all creationists, they believe that they have a startling truth that the public has been shielded from, and that if they present the facts, in quotation marks, that the scales will fall from the eyes and the charade of evolution



will be revealed.” She added, “These people are really serious about this.”

Canada, Roxton Falls: Evolution education was cited as among the reasons that a Mennonite community in Roxton Falls, Quebec — a town of 1300 about seventy miles east of Montreal — is considering departing the province. The *National Post* (2007 Aug 16) reported, “Fifteen English-speaking Mennonite families in this small community in the Monteregie Region say they won’t send their children to government-approved schools, balking at the teaching of evolution, the acceptance of gays and lesbians and low ‘morality standards.’” The families moved to Quebec from Manitoba in the 1990s; reports about unsanctioned schools in 2006 (see *RNCSE* 2006 Jul/Aug; 26 [4]: 13–16) led to a government investigation of the Mennonite private school in Roxton Falls, which fails to adhere to Quebec’s official curriculum. Warned of possible legal consequences, the families are considering moving to Ontario or New Brunswick; at least in Ontario, independent schools are not required to teach evolution. A spokesperson for the Quebec ministry of education explained, “We are not trying to prevent them from living their life the way they want, but they have to obey the law when it comes to educating their kids.”

Turkey: Wordpress, a San Francisco-based platform for bloggers, announced on its own blog on August 19, 2007, that the Turkish government apparently blocked all access to the blogs it hosts, due to a court decision obtained by Adnan Oktar, whose organization Bilim Aratırma Vakfı publishes a host of Islamic creationist books under the pen name Harun Yahya. Oktar reportedly objected to the unflattering treatment of him on a number of blogs hosted by Wordpress, which reproduced a letter purportedly from Oktar’s lawyer explaining the block and demanding that Wordpress “remove and prohibit any blogs in your site that contain my client’s name Adnan Oktar or his pen name Harun Yahya or vari-

ous combination of these 4 names” (see <<http://wordpress.com/blog/2007/08/19/why-were-blocked-in-turkey/>>). Deutsche Presse Agentur reported (2007 Aug 20) that a lawyer for Oktar explained that the court first ordered Turk Telecom to block a few sites but, because the allegedly libelous content was relocated to different Wordpress sites, “we applied to the court to order that all websites of Wordpress be blocked.” DPA added, “The sites that Oktar’s lawyers wanted removed were written by Edip Yuksel and his supporters. Yuksel is described as an Islamic reformist who is based in the United States and who has frequently criticized Oktar.”

Vatican City: Speaking to a group of Italian priests on July 24, 2007, Pope Benedict XVI again addressed the topic of evolution. Referring to debates over creationism in Germany and the United States, he suggested that evolution and belief in God the creator are presented “as if they were alternatives that are exclusive — whoever believes in the creator could not believe in evolution, and whoever asserts belief in evolution would have to disbelieve in God,” as the *New York Post*’s article (2007 Jul 26) translated it. “This contrast is an absurdity,” he continued, “because there are many scientific tests in favor of evolution, which appears as a reality that we must see and enriches our understanding of life and being. But the doctrine of evolution does not answer all questions, and it does not answer above all the great philosophical question: From where does everything come?” A transcript of his remarks, in Italian, is available on the Vatican’s website.

The Pope’s most recent remarks, although brief, suggest that he is continuing to maintain a form of theistic evolutionism, as he reportedly did in his contribution to *Schöpfung und Evolution* (Augsburg: Sankt Ulrich Verlag, 2007), the proceedings of a seminar on creation and evolution that he conducted with his former doctoral students in September 2006; according to Reuters (2007 Apr 11), “In the book, Benedict defended what is known as ‘theistic evolution,’ the view held by Roman

KENTUCKY PARK NATURALISTS VISIT “CREATION MUSEUM”

The opening of the Answers in Genesis Creation Museum has brought a steady stream of people to northern Kentucky, and some of them are also visiting state parks. The naturalists on the park staff interpret and explain the natural history of the parks to visitors, and, according to a report in the Lexington, Kentucky, *Courier Journal* (2007 Sep 1), visitors who have come from the Creation Museum are challenging these interpretations. So, in an effort to learn more about the source and basis of visitors’ objections, Chief Naturalist Carey Tichenor announced that a group of staff members will visit the Museum in early November 2007.

Tichenor emphasized that the park naturalists do not want to try to dissuade park visitors from their religious beliefs. “We will tell [visitors] if they want to believe what they saw at the Creation Museum that’s fine and good,” he said. “And then we explain to them why we are saying what we say at the park — which is interpreting the scientific evidence produced for the site.”

Kentucky Secretary of Commerce George Ward, whose cabinet portfolio includes the Department of Parks, told the *Courier Journal*, “This trip will let our naturalists be better prepared to deal with questions they get, and they will continue to talk about the scientific explanations at their parks.” However, when asked about the state’s promoting the creation museum through its visitors’ bureau (see p 6), Ward said, “[W]e also have a role to promote tourism in Kentucky, and we see the Creation Museum as a tourism attraction.”

Catholic, Orthodox and mainline Protestant churches that God created life through evolution and religion and science need not clash over this” (see *RNCSE* 2006 Nov/Dec; 26 [6]: 8). Although Cardinal Christoph Schönborn’s 2005 *New York Times* op-ed “Finding Design in Nature,” which seemed to express sympathy for “intelligent design” creationism, was widely feared to herald a possible shift in the Catholic Church’s attitude toward evolution, subsequent developments, including a series of clarifications from Schönborn, have for the most part indicated otherwise.

NCSE NEWS

Comings and Goings *Glenn Branch, NCSE Deputy Director*

It's mid-August 2007 as I'm writing, and it's been a bit of a whirl here in the office: one staff member is preparing to depart and four new staff members — two full-time, two part-time — are settling in. I hope that you'll join me and the rest of the staff in welcoming the newcomers and bidding farewell to the departing staffer.



Nick Matzke

N i c k Matzke, Public Information Project Director, is leaving NCSE to begin a PhD program at the Department of Integrative

Biology at the University of California, Berkeley. He came to NCSE in early 2004, planning to spend a year here before starting a PhD program (see *RNCSE* 2004 Jan/Feb; 24 [1]: 16); we feel fortunate to have had him around for two extra years. In addition to working at NCSE, he somehow found the time not only to blog regularly at The Panda's Thumb but also to contribute to the scholarly literature, coauthoring articles for *Nature Immunology*, *Natural Reviews Microbiology*, and *Proceedings of the National Academy of Sciences (USA)*, and contributing a chapter tracing the beginnings of "intelligent design" to the mid-1980s litigation over creation science to the new edition of *But Is It Science? The Philosophical Question in the Creation/Evolution Controversy* (Amherst [NY]: Prometheus Books, forthcoming). *Seed* magazine (2006: 2 [7]: 62) profiled him as one of its nine "Revolutionary Minds".

It was in the *Kitzmiller v Dover* case, however, that Matzke's star shone brightest. The staffer who was originally assigned to the case when it seemed as though it was just going to be a routine affair, he

was instrumental throughout the case, providing a wealth of scientific expertise and practical advice to the legal team representing the plaintiffs. In his book on the case, *40 Days and 40 Nights* (New York: Collins, 2007), Matthew Chapman humorously wrote of Matzke, "The NCSE staffer initially assigned to the Dover flare-up, he now briefed the lawyers on the arcane ins and outs of science. Bespectacled, in his thirties, he was tall and large and peered down at you with a look of beleaguered doubt, as if to say, 'You're asking me this question about science, but you know and I know that you're not going to understand my answer, so, although I find this stuff fascinating, wouldn't you really rather go for a beer?'" We'll be buying him one or two as we bid him a fond farewell. At Berkeley he can be reached at matzke@berkeley.edu.



Wesley R Elsberry

Wesley R Elsberry, Information Project Director, took a year's leave from NCSE to work as a Visiting Research Associate in the Lyman Briggs School of Science at Michigan State University. There he is collaborating with Robert T Pennock on a project examining the evolution of intelligent behavior using the artificial life platform Avida. He writes, "This project brings together a number of the topics that have interested me throughout my life: computation, evolutionary biology, and cognitive science." Joining NCSE to take care of the computers in Elsberry's absence on a part-time basis is **Stuart Fogg**, who brings extensive — and much-needed — experience with networking, Windows, Unix, and Macintosh systems with him. Also now working part-time for NCSE is

David Almandsmith, formerly a volunteer, who is helping with a number of clerical and administrative tasks; he replaces **Alex Wing**, who worked part-time here from December 2005 to June 2007.



David Almandsmith

Joshua Rosenau is NCSE's new Public Information Project Director, joining **Susan Spath** and replacing **Nick Matzke**. Rosenau comes to NCSE from the University of Kansas, where he was a graduate student in the Department of Ecology and Evolutionary Biology; he expects to complete and defend his dissertation on *Modeling Limits on Species' Ranges* by the end of 2007. In Kansas, he witnessed at first hand the antics of the creationist majority on the state board of education to undermine the treatment of education in the state science standards, and worked with the Kansas Coalition for Science and Kansas Citizens for Science to expose the problems with the majority's evolution-unfriendly version of the standards. His blog Thoughts from Kansas — which will have to be renamed now! — is part of the popular ScienceBlogs collection



Joshua Rosenau

run by the publishers of *Seed* magazine, and he belongs to the National Association of Science Writers. At NCSE, he will be working to help parents, teachers, and citizens in general who are facing challenges to evolution education in their communities; he will also be helping to improve NCSE's communi-

cation with the public and the press. (His e-mail address here is rosenau@ncseweb.org.)

Finally, **Anne D Holden** is NCSE's new Postdoctoral Scholar, replacing, after a hiatus, **Alan Gishlick**, who is now a visiting



Anne D Holden

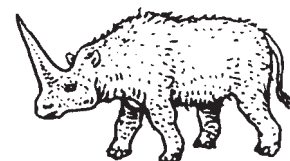
assistant professor in the Department of Geology at Gustavus Adolphus College in Saint Peter, Minnesota. Holden comes to

NCSE from the University of California, Berkeley, where she was a postdoctoral researcher in the Department of Integrative Biology, working with Leslea Hlusko; she earned her PhD in biological anthropology from Cambridge University, with a dissertation entitled *Sahara Passage: The Post-Glacial Re-colonization of North Africa by Mitochondrial L Haplotypes and its Role in Modern African Genetic Diversity*. In addition to her scientific work, she is keenly interested in communicating science to the general public: a member of the National Association of Science Writers, her publications include

essays published on-line in *The Naked Scientists* and *Inklings*. At NCSE, she will be helping to develop new educational and scientific resources and also, we hope, assisting in writing grants to enable NCSE to continue and expand its efforts to defend the teaching of evolution in the public schools. (Her e-mail address here is holden@ncseweb.org.)

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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** was interviewed by *US Catholic* (published by the Claretian Missionaries) for the cover story of its August 2007 issue (pages 13-6). Ayala addressed evolution and the overwhelming evidence for it, the scientific vacuity and theological shortcomings of "intelligent design", the recent discussion within the Catholic church about evolution, and the future of the science/religion dialogue. With respect to Cardinal Christoph Schönborn's 2005 op-ed in *The New York Times* that was widely perceived as questioning evolution, Ayala said:

I think he was taken advantage of. It turns out the vice president of the Discovery Institute in Seattle, an "intelligent design" think tank, is a friend of Schönborn. He persuaded the cardinal to write about "intelligent design", and the institute's public relations firm sent the article to *The New York Times*.

Within a month after it broke, three of us wrote a let-

ter to the pope: a Catholic biologist named Kenneth Miller, who had written a wonderful book on the subject; a physicist named Lawrence M Krauss; and me. We suggested there would be severe consequences for the Catholic Church in relation to science if Schönborn's piece were allowed to stand.

Within a month Schönborn essentially retracted the article in a speech at one of the Catholic universities in Vienna. He put his talk, in German, on his website. Of course not too many people here are likely to read long speeches in German. Then he issued a statement to the press saying that he was misunderstood and what he meant is not what he actually said.

Ayala is the Donald Bren Professor of Biological Sciences in the Department of Ecology and Evolutionary Biology at the University of California, Irvine; his latest book is *Darwin's Gift* (Washington [DC]: Joseph Henry Press, 2007).

Sean B Carroll reviewed the latest production of "intelligent design" proponent Michael Behe for *Science* (2007; 316: 1427-8),

contending that in *The Edge of Evolution* "Behe makes a new set of explicit claims about the limits of Darwinian evolution, claims that are so poorly conceived and readily dispatched that he has unwittingly done his critics a great favor in stating them." "Behe's chief error," he wrote, "is minimizing the power of natural selection to act cumulatively as traits or molecules evolve stepwise from one state to another via intermediates." The error is manifest both in Behe's reasoning — Carroll cited a number of problems, particularly a lack of quantitative thinking — and in his neglect of relevant scientific facts, causing Carroll to wonder, "Is it possible that Behe does not know this body of data? Or does he just choose to ignore it?" He concluded: "The continuing futile attacks by evolution's opponents reminds me of another legendary confrontation, that between Arthur and the Black Knight in the movie *Monty Python and the Holy Grail*. The Black Knight, like evolution's challengers, continues to fight even as each of his limbs is hacked off, one by one. ... The knights of ID may profess these blows are 'but a scratch' or 'just a flesh wound,' but the argument for design has no scientific leg to stand on." Carroll is a professor of biology at the University of



Wisconsin, Madison, and a Supporter of NCSE. For descriptions of reviews of *The Edge of Evolution* by **Jerry Coyne**, **Kenneth R Miller**, and **Michael Ruse**, see below. Additionally, see *RNCSE* 2007 Jan-Apr; 27 (1-2): 38-40 for a review by **David E Levin**, and *The New York Times* Sunday Book Review (2007 Jul 1) for a no-holds-barred review by Richard Dawkins.

Two of the three scholars newly elected as Fellows of the Committee for Skeptical Inquiry (formerly the Committee for the Scientific Investigation of Claims of the Paranormal) are affiliated with NCSE: **Sean B Carroll**, a professor of molecular genetics at the University of Wisconsin, Madison; the author of *Endless Forms Most Beautiful* (New York: WW Norton, 2005) and *The Making of the Fittest* (New York: WW Norton, 2006), and a Supporter of NCSE, and **Barbara Forrest**, a professor of philosophy at Southeastern Louisiana University, coauthor with **Paul R Gross** of *Creationism's Trojan Horse: The Wedge of Intelligent Design* — now available in paperback (New York: Oxford University Press, 2007) — and a member of NCSE's board of directors. For details, see *Skeptical Inquirer* (2007 Sep/Oct; 31 [5]: 8-9). Of interest in the same issue of *Skeptical Inquirer* are a column discussing recent public opinion polls on evolution (p 5-6), a box discussing one Canadian's campaign to convince the government to support evolution (p 6), a review of the recent Broadway revival of *Inherit the Wind* (p 11), a note about **Andrew Fraknoi**'s award from the Astronomical Society of the Pacific (p 14; see below), and a response by the authors of *The Top 10 Myths about Evolution* to *Skeptical Inquirer*'s review of their book (p 66).

Jerry Coyne devoted 7500 words to reviewing Michael Behe's *The Edge of Evolution* in the June 18, 2007, issue of *The New Republic*, providing a great deal of useful background information in the process. Coyne, like **Sean B Carroll** (see above), worried about the propaganda value of the book, writing, "The general reader, at whom *The Edge of Evolution* is

aimed, is unlikely to find the scientific holes in its arguments. Behe writes clearly and engagingly, and someone lacking formal training in biochemistry and evolutionary biology may be easily snowed by his rhetoric." In fact, however, Behe's arguments betray "a profound, almost willful ignorance of the evolutionary process," and his offered alternative of "intelligent design" is "infinitely malleable in the face of counterevidence, cannot be refuted, and is therefore not science." Coyne summarized: "Behe's new theory remains the same old mixture of dead science and thinly disguised theology. There is no evidence for his main claim of non-random mutation, and scientists have plenty of evidence against it. His arguments against the Darwinian evolution of complex organisms are flawed and misleading. And there is not a shred of evidence supporting his claim that the goal of evolution is intelligent life." Coyne is a professor in the Department of Ecology and Evolution at the University of Chicago. For descriptions of reviews of *The Edge of Evolution* by **Sean B Carroll**, **Kenneth R Miller**, and **Michael Ruse**, see above and below.

Writing in *Trends in Biochemical Sciences* (2007; 32 [7]: 301-10), **Barbara Forrest** and **Paul R Gross** took the case against "intelligent design" to biochemists. Forrest and Gross are the authors of the definitive history of the "intelligent design" movement's so-called Wedge strategy, *Creationism's Trojan Horse: The Wedge of Intelligent Design* — now available in paperback (New York: Oxford University Press, 2007) with a new chapter on *Kitzmiller v Dover*, in which Forrest, a member of NCSE's board of directors, was a pivotal expert witness for the plaintiffs. The abstract of their article:

Creationists are attempting to use biochemistry to win acceptance for their doctrine in the public mind and especially in state-funded schools. Biochemist Michael Behe is a major figure in this effort. His contention that certain cellular structures and biochemical processes — bacterial flagella,

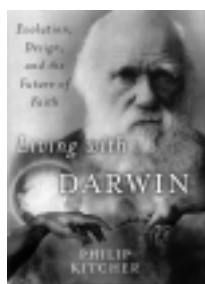
the blood-clotting cascade and the vertebrate immune system — cannot be the products of evolution has generated vigorous opposition from fellow scientists, many of whom have refuted Behe's claims. Yet, despite these refutations and a decisive defeat in a US federal court case, Behe and his associates at the Discovery Institute continue to cultivate American supporters. They are also stepping up their efforts abroad and, worryingly, have achieved some success. Should biochemists (and other scientists) be concerned? We think they should be.

Although Forrest and Gross survey Behe's involvement with creationism from before his book *Darwin's Black Box* to the aftermath of the *Kitzmiller* trial, Behe's new book *The Edge of Evolution* (New York: Free Press, 2007) — which has already taken a pounding in review after review after review — is not discussed in the article. But Forrest and Gross in effect already saw it on the horizon, for in their concluding paragraph, they write, "If there is a single most important lesson for scientists and concerned citizens, it is that creationists never give up. They merely change their strategy with each defeat, necessitating corresponding adjustments and constant vigilance by their opponents."

Andrew Fraknoi was named the recipient of the 2007 Robert H Emmons Award for Excellence in College Astronomy Teaching by the Astronomical Society of the Pacific. In a May 15, 2007, press release, the ASP wrote, "A distinguished astronomy educator with a national reputation, Mr Fraknoi is a long-time very popular community college instructor, textbook author, co-founder of the *Astronomy Education Review*, prolific writer and speaker, founder of the 'Cosmos in the Classroom' workshops for college faculty, and former Executive Director of the ASP." Fraknoi teaches astronomy at Foothill College in Los Altos Hills, California; he is a coauthor of the valuable publication "An ancient universe: How

astronomers know the vast scale of cosmic time" (*The Universe in the Classroom* 2001 Fall; 56: 1-23; available on-line via <<http://www.astrosociety.org/education/publications/tnl/56/index.html>>).

Philip Kitcher appeared on the Center for Inquiry's podcast Point of Inquiry for July 13, 2007, discussing his latest book, *Living with Darwin: Evolution, Design, and the Future of Faith* (New York: Oxford University Press, 2006), with host DJ Grothe. (Visit <<http://www.pointofinquiry.org/?p=118>> to listen.) *Living with Darwin* received a glowing review from H Allen Orr in the *New York Review of Books* (2007 Aug 16; 54 [13]: 33-5). Orr wrote, "Kitcher's survey of creationist thought is



superb and his conclusion unequivocal: all three creationist positions are hopelessly flawed. They are dead science." And concluding his review, he added, "In a time of strident pronouncements on the intersection of science and religion, Kitcher has introduced a calm and human voice. We Darwinians could do much worse than to listen to it." A Supporter of NCSE, Kitcher is the John Dewey Professor of Philosophy at Columbia University. He is the author of many books, including the classic critique of young-earth creationism, *Abusing Science: The Case Against Creationism* (Cambridge [MA]: MIT Press, 1982), which Orr credited with playing a part "in the demise of scientific creationism".

William F McComas is the winner of the 2007 Evolution Education Award from the National Association of Biology Teachers, according to a press release issued on August 29, 2007, by the American Institute of Biological Sciences. The award, sponsored by AIBS and the Biological Sciences Curriculum Study, recognizes innovative classroom teaching and community education efforts to promote the accurate understanding of biological evolution. "Only by recognizing and discussing the challenges of evolution instruction

and by developing and sharing strategies for its solution can we hope to return evolution to its rightful place as the unifying concept of modern biology," McComas was quoted as saying in a press release issued on August 27, 2007,



William F McComas and friend
Photo: Kim McComas

by the University of Arkansas, where he is the Parks Family Professor of Science Education in the College of Education and Health Professions. He will receive the award, which includes a plaque and a prize of \$1000, at the NABT national conference in Atlanta, Georgia, in November 2007, where he will deliver the inaugural Kendall/Hunt Lecture in Biology Education. A long-time member of NCSE, McComas is the author of numerous articles on science education and the editor of two books, the latest being *Investigating Evolutionary Biology in the Laboratory* (Dubuque [IA]: Kendall/Hunt 2006).

NCSE Supporter **Kenneth R Miller** weighed in with his critical review of the new book from "intelligent design" proponent Michael Behe, published in *Nature* (2007; 447: 1055-6). Miller began with the sociopolitical context, writing, "Michael Behe's new book, *The Edge of Evolution*, is an attempt to give the intelligent-design movement a bit of badly needed scientific support. After a spectacular setback in the 2005 Dover, Pennsylvania, intelligent-design trial ... , and the 2006 electoral losses in Ohio and Kansas, the movement could use some help — and Behe is eager to provide it."

But Miller quickly moved to the content of the book, focusing on a central calculation that, Behe alleges, reveals the "limits of Darwinism." On the contrary, Miller wrote: "at the heart of his anti-Darwinian calculus are numbers not merely incorrect, but so spectacularly wrong that this badly designed argument collapses under its own weight ... It would

be difficult to imagine a more breathtaking abuse of statistical genetics. ... A mistake of this magnitude anywhere in a book on science is bad enough, but Behe has built his entire thesis on this error."

Concluding, Miller returned to the sociopolitical context: "No doubt creationists who long for a scientific champion will overlook the parts of this deeply flawed book that might trouble them, including Behe's admission that 'common descent is true', and that our species shares a common ancestor with the chimpanzee. Instead, they will cling to Behe's mistaken calculations, and proclaim that the end of evolution is at hand. What this book actually demonstrates, however, is the intellectual desperation of the intelligent-design movement as it struggles to survive in the absence of even a shred of scientific data in its favour."

Miller is Professor of Biology at Brown University, the coauthor (with Joseph Levine) of three widely used high school biology textbooks, and the author of *Finding Darwin's God: A Scientist's Search for Common Ground Between God and Evolution* (San Francisco: Cliff Street Books, 1999), and the forthcoming *Devil in the Details: Evolution and the Battle for America's Soul* (New York: Viking/Penguin, 2007). He is also a Supporter of NCSE and received its Friend of Darwin award in 2003; he testified for the plaintiffs in *Kitzmiller v Dover*, the case in which it was ruled that it is unconstitutional to teach "intelligent design" creationism in the public schools. For descriptions of reviews of *The Edge of Evolution* by **Sean B Carroll**, **Jerry Coyne**, and **Michael Ruse**, see above and below.

Kevin Padian reviewed three books about *Kitzmiller v Dover*, in which teaching "intelligent design" creationism in the public schools was found to be unconstitutional, in the July 19, 2007, issue of *Nature* (448: 253-4). "A gullible and obstinate school board in the middle of Pennsylvania's rolling hills was just crazy enough to buy [intelligent design]," he wrote, "and that was the start of the now-famous Dover case." Summarizing



the different approaches of the books, Padian explained:

The author of *40 Days and 40 Nights*, Matthew Chapman, is a great-great-grandson of Charles Darwin; his presumed vested interest in the proceedings is tempered by his own history as a school dropout, a movie screenwriter and a Brit with a perpetually bemused view of colonial antics. Still, his odyssey is a fulfilling one, and he seems genuine enough to get himself invited into many homes where insights and passions run deep. Gordy Slack, author of *The Battle Over the Meaning of Everything* and an experienced science writer and editor, likewise brings his own family baggage (his father is a staunch fundamentalist) to his account, but his reporting is more linear and his background research deeper. Edward Humes in *Monkey Girl* is even more scholarly and thorough in his approach, and contextualizes the trial historically. Unlike Chapman and Slack, he does not insert himself into his narrative, but his views of the proceedings are no less clear.

Padian praised all three of the books as “entertaining and informative,” giving the nod to Humes’s *Monkey Girl* on account of its comprehensiveness; he also mentions a fourth book, by local reporter **Lauri Lebo**, to appear on the trial, which, he said, “promises even more lively details of this perfect storm of religious intolerance, First Amendment violation and the never-ending assault on American science education.” (Lebo’s book, entitled *The Devil in Dover: A Journalist’s Story of Dogma v Darwin in Small-Town America*, will appear in 2008.)

The president of NCSE’s board of directors, Padian himself testified on behalf of the plaintiffs in the *Kitzmiller* trial; in his decision, Judge Jones commented, “Dr Padian’s demonstrative slides, prepared on the basis of peer-

reviewed scientific literature, illustrate how Padas systematically distorts and misrepresents established, important evolutionary principles.” A transcript of his expert witness testimony in the trial, complemented with the slides that he displayed in the courtroom, is available on-line at <http://www2.ncseweb.org/kvd/exhibits/Padian/Padian_transcript.html>.

Kevin Padian and his colleagues captured the cover of *Science* with their paper “A late Triassic dinosauro-morph assemblage from New Mexico and the rise of dinosaurs” (*Science* 2007; 317: 358-61). In a July 19, 2007, press release, Padian was quoted as explaining the significance of the research reported in the paper: “Up to now, paleontologists have thought that dinosaur precursors disappeared long before the dinosaurs appeared, that their ancestors probably were out-competed and replaced by dinosaurs and didn’t survive ... Now, the evidence shows that they may have coexisted for 15 or 20 million years or more.” Speaking of the first two authors of the paper, graduate students Randall Irmis and Sterling Nesbitt, who excavated a host of new fossils from the Hayden Quarry at Ghost Ranch, Padian added, “Randy and Sterling were clever to find all this stuff; these guys have just done terrific work.” Professor of Integrative Biology at the University of California, Berkeley, and Curator of Paleontology at the University of California Museum of Paleontology, Padian is also president of NCSE’s board of directors.

Writing in the *Toronto Globe and Mail* (2007 Jun 2), **Michael Ruse** offered his assessment of Michael Behe’s *The Edge of Evolution* with his customary affability, describing Behe as “warm and friendly” and saying that *Darwin’s Black Box* “makes the case for [“intelligent design”] in the most user-friendly manner possible.” But he was disappointed by *The Edge of Evolution*, which in comparison to *Darwin’s Black Box* seemed “a bit of a sad sack. Nothing very much new, old arguments repeated, opposition ignored or dismissed without argu-

ment.” What seems to interest Ruse the most about *The Edge of Evolution* is the degree to which it embraces claims that are anathema to young-earth creationists: “What does surprise me is how emphatic Behe now is in putting a distance between himself and the older Creationists. For a start, he stresses his commitment to evolution. He thinks the world of life is as old as is claimed by any more conventional biologist. He also wants to give natural processes of change a role in life’s history.” But in the end, Ruse found the book saddening: “with so many important issues waiting for attention in our society, I am just a bit depressed that anyone would think that something like [“intelligent design”] is worth pushing or that it gains so much attention others have to spend time refuting it.” Ruse is a professor of philosophy at Florida State University and a Supporter of NCSE. For descriptions of reviews of *The Edge of Evolution* by **Sean B Carroll**, **Jerry Coyne**, and **Kenneth R Miller**, see above.

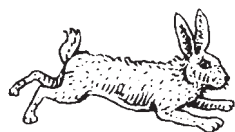
NCSE’s executive director **Eugenie C Scott** was awarded the Viktor Hamburger Outstanding Educator Prize for 2007 from the Society for Developmental Biology, during the First Pan American Congress in Developmental Biology, held June 16–20, 2007, in Cancun, Mexico. The prize, established in honor of Viktor Hamburger, a pre-

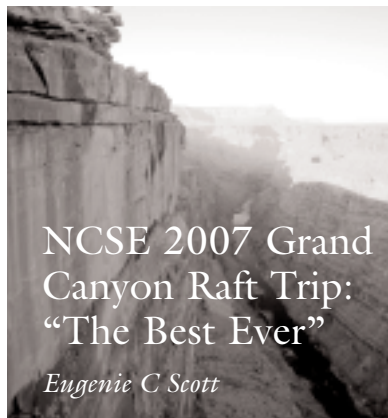


Eugenie C Scott

minent embryologist and developmental neuroscientist of his era, recognizes individuals who have made outstanding contributions to devel-

opmental biology education. Previous recipients include Robert DeHaan, NCSE Supporter **Bruce Alberts**, Leon Browder, Lewis Wolpert, and Scott Gilbert. Founded in 1939, the Society for Developmental Biology seeks to promote the field of developmental biology and to advance our understanding of developmental biology at all levels.





NCSE 2007 Grand Canyon Raft Trip: "The Best Ever"

Eugenie C Scott

From July 17 to July 24, 2007, twenty-two NCSE members accompanied paleontologist Alan D Gishlick and me on two motorized rafts down the mighty Colorado River on a journey of over 300 miles. We began our trip at the traditional raft put-in at Lee's Ferry near Marble Canyon, Arizona, early in the morning of July 18. For the next seven days, we rafted the river — including running dozens of rapids, some of them at the 8-10 rating level — hiked side canyons, enjoyed delicious food, and camped at night under the brilliant Arizona stars.

Gishlick did a terrific job of helping us understand the geology of Grand Canyon, the 1200 meters or more of strata having been laid down as this part of the Colorado Plateau experienced a variety of ecological conditions over time. As we traveled down the river and back in time, NCSE's own "Gish" explained how different strata reflected different depositional conditions ranging from deep seas to marshes. He showed us fossils and explained how they help us to understand the ecological environment at the time the strata were laid down, and then explained how the canyon itself had been carved by a combination of the natural tendency of water to seek its own level, and the slow uplift of the Colorado Plateau.

My job, on the other hand, was to explain the creationist version of the formation and cutting of the Canyon, which took me far less time. (Short version, which is not much shorter than the long version: The Flood.) I do not think that the raft trip participants —

Eugenie C Scott is executive director of NCSE.

the list included the usual assortment of biologists, chemists, physicists, computer scientists, and teachers — were especially persuaded by creationist science, and in fact they brought up many problems with the creation science "model".

The fellowship was excellent, the science was first-rate, and the weather was beautiful (remember: I grew up in Wisconsin, and dry hot weather is heavenly to me). The lack of rain meant the normally ruddy Colorado River stayed clear almost to the end of our trip. Washing oneself in the Colorado takes a bit of getting used to, assuming one does not usually bathe in chilly water, but after a day of hot sun, it feels great. Personally, I cannot wait to go back next year.

And if any readers or friends want to join me, the dates are from July 30 to August 6, 2008. We will be there for the start of the Pleiades meteor shower — always a treat. Visit NCSE's website <<http://www.ncseweb.org/GC2008/>> for information about the trip. Get in touch with Nina Hollenberg at NCSE if you want to sign up. A deposit of \$500 will hold your place. But hurry: as I write, there are only 12 places left!

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Renewed Concern About Creationism at Grand Canyon National Park

Glenn Branch,
NCSE Deputy Director

Toward the end of 2006, Public Employees for Environmental Responsibility — "a national non-profit alliance of local, state and federal scientists, law enforcement officers, land managers and other professionals dedicated to upholding environmental laws and values" — charged the National Park Service with stalling on a promised review of a creationist book sold at the bookstores at Grand Canyon National

Park. Although the park's bookstores are operated by a separate non-profit organization, the Grand Canyon Association, the National Park Service is responsible for approving the items that are sold there. In August 2003, the NPS approved the sale of *Grand Canyon: A Different View*, edited by Tom Vail and published by Master Books, the publishing arm of the Institute for Creation Research. *A Different View* expounds a young-earth creationist view of the geology of the canyon, and proclaims, "all contributions have been peer-reviewed to ensure a consistent and biblical perspective." In his review of the book (*RNCSE* 2004 Jan/Feb; 24 [1]: 33-6), the geologist Wilfred Elders described it as "Exhibit A' of a new, slick strategy by biblical literalists to proselytize using a beautifully illustrated, multi-authored book about a spectacular and world-famous geological feature," adding, "Allowing the sale of this book within the National Park was unfortunate. In the minds of some buyers, this could imply NPS approval of young-earth creationists and their religious proselytizing."

After the sale of *A Different View* was approved, the superintendent of the park appealed to the NPS headquarters for "a review of the book in terms of its appropriateness," and the Chief of the Park Service's Geologic Resources Division recommended its removal, saying that it "does not use accurate, professional and scholarly knowledge; is not based on science but a specific religious doctrine; does not further the public's understanding of the Grand Canyon's existence; [and] does not further the mission of the National Park Service." Meanwhile, the sale of the book became a matter of public controversy (see *RNCSE* 2004 Jan/Feb; 24 [1]: 4-5). Elders's review appeared in *Eos* (the weekly newsletter of the American Geophysical Union); the presidents of the American Paleontological Society, the American Geophysical Union, the National Association of Geoscience Teachers, the Association of American State Geologists, the Society for Vertebrate Paleontology, the American Geological



Institute, and the Geological Society of America signed a joint letter to the NPS, urging that *A Different View* be removed “from shelves where buyers are given the impression that the book is about earth science and its content endorsed by the National Park Service” (see *RNCSE* 2004 Jan/Feb; 24 [1]: 19); and stories about the controversy appeared in the *Los Angeles Times* and *The New York Times*. A spokesperson for the NPS repeatedly assured the press and Congress that the promised review would be forthcoming.

In its December 28, 2006, press release, however, PEER charged, “Despite promising a prompt review of its approval for a book claiming the Grand Canyon was created by Noah’s flood rather than by geologic forces, more than three years later no review has ever been done and the book remains on sale at the park.” Jeff Ruch, executive director of PEER, commented, “As one park geologist said, this is equivalent of Yellowstone National Park selling a book entitled *Geysers of Old Faithful: Nostrils of Satan*.” In a December 28, 2006, letter, PEER urged the new director of the NPS, Mary Bomar, to remove the book from sale at the park’s bookstores and museums as well as to “[p]rovide training to the interpretive staff at Grand Canyon NP regarding how to answer questions from the public concerning the geologic age of the Canyon and related matters; and ... [a]pprove an updated version of the long-stalled pamphlet ‘National Park Service Geologic Interpretive Programs: Distinguishing Science from Religion’ for distribution to agency interpretive staff.” It ought to be noted that PEER was not accusing the NPS of forbidding its interpretive staff to present the scientific facts about the canyon’s age and geology. Unfortunately, careless wording in its press release suggested otherwise, and PEER’s credibility suffered as a result, obscuring PEER’s important charge that the NPS is not providing its staff with the resources it needs to present the scientific facts about the canyon’s age of geology effectively, especially when faced with park visitors who have questions about, or even

embrace, views that reject those facts on religious grounds.

Prompted by PEER’s press release, the controversy over the sale of *A Different View* began to attract attention again in the media, with the *Arizona Daily Sun* (2007 Jan 4) offering a report in which a spokesperson for the NPS was quoted as saying, “We do not use the creationist text in our teaching, nor do we endorse its content. However, it is not our place to censor alternate beliefs.” The *Sacramento Bee* (2007 Jan 4) suggested, in a forceful and cogent editorial entitled “Don’t use parks to promote creationism,” “A new year and a new National Park Service director mark an opportunity for change. Here’s an easy one. Settle the 3-year-old controversy about a creationist account of the Grand Canyon.” The editorial argued that “Mary Bomar, the new National Park Service director, should send a message that programs and materials in national parks present the best scientific evidence and don’t endorse any particular religious beliefs,” and concluded by urging Bomar to do so quickly:

Remove the book from sale from within the park; its proper place is for sale in private bookstores outside the public park. Equally important, finish the long-delayed pamphlet ... and distribute it to park rangers. The nation’s public parks are not the place to promote religious theories about the formation and development of Earth.

A spokesperson for the NPS, David Barna, told *The New York Times* (2007 Jan 5) that there was no formal review of whether the bookstores ought to discontinue selling *A Different View* in part because of differences among the NPS’s specialists. According to the *Times*, “When officials got together to discuss the book, the geologists and natural resource specialists would say, ‘Get this book out of here,’ Mr. Barna said. ‘But the education and interpretation people would say: ‘Wait a minute. If your science is so sound, the fact that there are differences of opinion should not scare you away.’” In a written statement, the *Times* reported, Barna “notes

that Park Service management policies require reliance on ‘the best scientific evidence available’ and, as a result, rangers tell visitors that “the Colorado River basin has developed in the past 40 million years.” But the *Times* also reported, “the guidelines also say that material available from concessionaires in national parks should adhere to the standards used to evaluate Park Service materials.” PEER’s executive director Jeff Ruch was quoted as contending that selling the book promoted fundamentalist Christian views: “This is government establishment of religion in a fairly fundamental way, if you pardon the pun.”

Ronald Bailey, the science columnist for *Reason*, heard NCSE’s executive director Eugenie C Scott speak about the controversy at the James Randi Educational Foundation’s event The Amazing Meeting V, and promptly went to Grand Canyon National Park to see *A Different View* for himself. He reports, “As I was buying it, I asked the clerk what she thought about it. ‘We’re not allowed to say anything about it,’ she said covering her mouth with her hand in the ‘Speak No Evil’ monkey fashion. ‘Oh come on,’ I cajoled, but the clerk refused any further comment. Later I went in search of it at the other south rim Park Service bookstore at Desert View. In this much smaller bookstore, Vail’s slender Flood geology volume was mixed in among the other photo books. Again, I asked this clerk what she thought, and she smiled and replied, ‘All I will say is that it’s got some really beautiful photographs’” (2007 Jan 26; available on-line at <<http://reason.com/news/show/118334.html>>). Acknowledging that the NPS-overseen bookstores carry books that present and discuss the creation myths of Native Americans, Bailey nevertheless drew the crucial distinction: “unlike books on native creation myths, Vail insists that he is making scientific claims about how rock layers are laid down, fossils formed and the canyon carved.”

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Dry Rot, Not Arson: National Park Service and Science

Wesley R Elsberry

*In the Grand Canyon,
Arizona has a natural
wonder which is in
kind absolutely
unparalleled
throughout the rest of
the world. I want to
ask you to keep this
great wonder of nature
as it now is. I hope
you will not have a
building of any kind,
not a summer cottage,
a hotel or anything else,
to mar the wonderful
grandeur, the sublimity,
the great loneliness and
beauty of the canyon.
Leave it as it is. You
cannot improve on it.
The ages have been at
work on it, and man
can only mar it.
— Theodore Roosevelt*



In 2007 the nation marks the 60th anniversary of the signing of the bill setting aside land for Theodore Roosevelt National Memorial Park. Roosevelt was a large figure in the movement to establish the national park system, so it only seems appropriate to take up an issue about how the National Park Service is operating now.

Public Employees for Environmental Responsibility (PEER) issued a press release (available on-line at <http://www.peer.org/news/news_id.php?row_id=801>) on December 28, 2006, pointing out that the National Park Service (NPS) was at that point three years delinquent in delivering a promised review of its sale of a creationist book, Tom Vail's *Grand Canyon: A Different View* (Green River [AR]: Master Books, 2003; reviewed in *RNCSE* 2004 Jan/Feb; 24 [1]: 33–6). The release, unfortunately, included ambiguous phrasing whose most likely reading yielded a false claim that NPS had issued a “gag order” to its rangers and docents in the Grand Canyon national park to stay silent on the geological age of features in the park.

I investigated the situation with the national park interpretative exhibits, curricula, and bookstore merchandise. While there has not been an explicit “Don’t talk about the age of the earth or park geology” directive issued to rangers and docents, there is entirely too much credulous stuff that offers to take anti-science sources seriously. Rangers and docents are officially encouraged to tell park visitors

about the “tenets and explanations of Creationism”. In evidence of a state of neglect when it comes to the accuracy of merchandise in the parks, it turns out that Tom Vail's *Grand Canyon: A Different View* is not the only anti-science tome available for sale in park gift shops; Vine Deloria Jr's *Red Earth, White Lies* (New York: Scribner, 1995; reviewed in *RNCSE* 1998 Nov/Dec; 19 [6]: 10–4) may also be picked up at various stores.

Several people have accurately criticized the overblown claim of the original PEER press release concerning a gag order on interpretative staff telling visitors about deep time, essentially exonerating NPS of committing arson in its approach to science. But I feel that many have overlooked other data that indicate a general administrative strategy of encouraging dry rot instead — de-emphasizing the science content associated with park interpretative programs and credulously relating creationism and other anti-science stances.

THE NPS POLICY MUDDLE

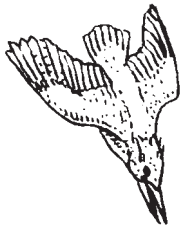
There is a clear statement in the NPS policy guidelines (available on-line at <<http://www.nps.gov/policy/mp/policies.html>>) about the relationship between sensitivity to multiple points of view and scientific validity (see section 7.5.3, “Resource Issue Interpretation and Education”):

In instances in which programming affects resources managed by other agencies, such agencies should be consulted during program planning. For interpretation of resource issues to be effective, frontline interpretive staff must be informed about the reasoning that guided the decision-making process, and interpreters must present balanced views. Acknowledging multiple points of view does not require interpretive and educa-

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tional programs to provide equal time or disregard the weight of scientific or historical evidence. Resource issue interpretation should be integrated into both on- and off-site programs, as well as into printed and electronic media whenever deemed appropriate by the park manager.

This policy, if it had been followed, would have short-circuited everything that I will discuss: the Vail and Deloria books would have been rejected for sale in park bookstores, and no mention of creationism would have gone into a policy document insisting on accuracy in knowledge of the resource. It will become obvious that this particular component of policy has been roundly ignored.



CREATIONISM AS AN OFFICIALLY SANCTIONED TALKING POINT

In order to find the evidence of dry rot in the NPS administration's approach to science, one must peel back the right bit of drywall. The relevant place to look is in the NPS "Interpretive Development Program", Module 340, "Advanced Knowledge of the Resource" (available on-line at <<http://www.nps.gov/idp/interp/340/kr.htm>>).

There are two chunks that appear to have been written with anti-evolution-speak in mind (emphasis added):

III. Accuracy and current information — Why?

Interpretation that is accurate provides a verifiable and comprehensive description, is errorless, and conforms to facts. An interpreter must always be accurate. All resource meanings, with enough knowledge and understanding, can and must be interpreted accurately. For example: an interpreter can accurately describe and explain the theory of Evolution *as well as the tenets and explanations of Creationism*. Likewise an interpreter can accurately describe and explain theories, perceptions, and understandings from the past that effect [*sic*], conflict with,

and/or contribute to theories, perceptions, and understandings in the present.

Interpretation that is current incorporates recent and ongoing discussion of the resource and its subject matter. This includes questions being asked by scholars, specialists, *and the general public* as well as what they are thinking and saying about the work that is being done. There can be multiple current explanations, theories, and interpretations that complement and/or conflict with each other. *Currency also includes understanding of the general acceptance and use of a position by the professional community as well as popular culture and specific groups of people.* An interpreter uses current information to provoke or provide additional opportunities for the audience to make their own intellectual and emotional connections to the resource.

and

B. Effective interpretation requires comprehensive knowledge, understanding, and explanation of multiple resource meanings and audience perspectives — *not just popular and current ones*, in order to:

1. be relevant;
 2. demonstrate familiarity with diverse sources of knowledge and opinion, which engenders trust in the open-mindedness of the interpreter;
 3. demonstrate respect for audience points of view;
 4. encourage dialogue;
 5. provoke or provide diverse audiences with opportunities for personal intellectual and emotional connections with the meanings of the resource;
 6. allow audiences to make decisions for themselves.
- (See: Appropriate Techniques: Connecting Multiple Resource Meanings to Multiple Audience

Interests and Perspectives component.)

7. provide context for NPS perspectives.

As the saying goes, keep an open mind — but not so open that your brains fall out. Elsewhere on the NPS website, treatment of "creationism" is discussed in terms of the relationship between ranger and park visitor, as NPS reiterates that rangers must be able to make the park features relevant to all visitors. We know from repeated Gallup polls that more than 40% of the US population, and thus about the same proportion of park visitors to the Grand Canyon, is likely to reject ages that suggest that the earth is older than about 10 000 years (see *RNCSE* 2004 Sep/Oct; 24 [5]: 19).

It is one thing to counsel park rangers and docents to be respectful of visitors and their beliefs, as does the NPS website, but quite another to encourage them to explain creationism to park visitors in contravention of policy section 7.5.3 (quoted above). The presence of "creationism" within a discussion of "knowledge of the resource" and tied to an example of "accuracy" is not credibly or even arguably about visitor relations; this is in effect an assault upon the ability of science to distinguish explanations that are supported by evidence from those that are contradicted by evidence, and which privileges the latter. It is contrary even to the plain meaning of the lead sentence of the paragraph within which it is embedded. That's not knowledge, and it certainly isn't accurate.

To ascertain how these policies play out in practice in the parks, I called the Public Affairs office at Grand Canyon National Park and was directed to Leah McGinnis. Identifying the source, I read her the passage containing the example of using creationism to establish accuracy in knowledge of the resource. She said that she was not familiar with the document and could not comment on it. I asked what role the document played in determining interpretative programs. She said that she did not know about the specific docu-

ment, but assured me that interpretative staff was delivering “science-based information” to the public.

The date of last modification of the section is given as September 2001. It is difficult to imagine how an official policy encouraging the use of creationism in interpretation would not directly affect the work of the interpretative staff in the national parks. Even if the Public Affairs office does not have the complete picture of what is being brought to bear upon interpretative staff, the document’s content is ominous — setting up an impossible task for interpreters trying to adhere to the NPS administration’s stance on providing accurate science to park visitors, following section 7.5.3 of the policy guidelines, and the directives in Module 340.

MALIGN NEGLECT: ANTI-SCIENCE SECTIONS IN BOOKSTORES

In addition to the disputed book by Tom Vail, there is another notorious anti-science tome gracing official park service bookstore shelves. That book is Vine Deloria Jr’s *Red Earth, White Lies*. A commenter on Phil Plait’s Bad Astronomy blog (see comment 23 at <<http://www.badastronomy.com/bablog/2006/12/29/bush-white-house-still-promoting-creationism/>>) claimed that this book is a legacy of approval during the Clinton administration, though I have been unable to confirm a date of approval for it. I was incredulous that NPS would approve such a polemic for sale by park bookstores, so I called one of the stores, the Walnut Canyon National Monument bookstore, and asked for stock and price information. (Yes, it is in stock, and it is priced at \$18.95.)

NPS contracts out its bookstores to concessionaires and cooperating associations. So is it just the concessionaire or cooperating association making the decision? For the Grand Canyon in particular, the bookstores are run by a cooperating association, the Grand Canyon Association. Because I was not able to view the contracts online, I can only presume that the contracts in Grand Canyon National Park are handled as in the

Glacier Bay park, where the contract (available on-line at <<http://www.nps.gov/glba/parkmgmt/upload/GLBA001-04.pdf>>) plainly says that NPS reserves the right to reject any merchandise offered by the concessionaire or cooperating association.

(1) The Director reserves the right to determine and control the nature, type and quality of the visitor services described in this CONTRACT, including, but not limited to, the nature, type, and quality of merchandise, if any, to be sold or provided by the Concessioner within the Area.

The cooperating association relationship to NPS is even closer than a contract with a concessionaire. For example, the space NPS provides for the GCA is within the Visitor Center on the North Rim, and a separate building within the Visitor Center Complex on the South Rim.

I asked Grand Canyon National Park Public Affairs spokesperson Leah McGinnis about the book approval process. She told me that a book submission involves NPS park review, and that for the Grand Canyon National Park, that is a five-person endeavor. Each person has a set of criteria they apply to their review of the book. One of those includes the “fit with other materials and merchandise,” a clear strike against the anti-science titles noted. The “Park Service Review” person, though, applies the clearest criterion relevant in this case, that the book must be accurate. Whatever else goes on in the approval process, it still is the case that NPS’s own policies state that inaccurate books will be rejected. Objecting to the presence of books like Vail’s in the Grand Canyon bookstores is not, therefore, endorsing “book-banning” or censorship; it is criticizing a governmental entity’s dereliction of its

responsibility to conform to its established policies.

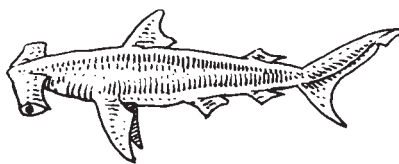
What’s more, the fact that a title is stocked and sold in park bookstores sends the clear message that NPS approves of the content as an accurate account of its subject matter. So placement of a book in a NPS park bookstore means much more than the offer for sale of the same book by a commercial vendor such as Amazon.com, Barnes and Noble, or Borders. Those firms do not vouch for the *accuracy* of what they sell to the public; the National Park Service does. Once it becomes clear that a mistake was made in the selection process for a book being sold on park premises, review and action should follow with all due bureaucratic speed. Neglecting the issue of the suitability of the Vail book for three to four years is not competence in action.

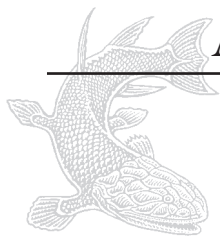
The only way to preserve the integrity of its scientific credibility is for the NPS to review, without delay, the suitability of offering for sale in the NPS bookstores the Vail book and other legacy anti-science titles, under the Park Service Review criteria already in place. The scientific experts at the Grand Canyon should be relied upon to determine the accuracy of fact claims made in the books. Their opinion should be heeded, not dismissed with post-modernist posturing. The dry rot in attitudes toward science needs to be examined, investigated, and excised from the National Park Service. The bluff plain-talking president Teddy Roosevelt would surely be disappointed in the manner in which his legacy has been treated.

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[A longer version of this article was posted on The Panda’s Thumb blog on April 25, 2007; see <http://www.pandasthumb.org/archives/2007/04/more_national_p.html>.]





Has Natural Selection Been Refuted?

Joe Felsenstein

“Intelligent design” (ID) is the assertion that there is evidence that major features of life have been brought about, not by natural selection, but by the action of a designer. This involves negative arguments that natural selection could not possibly bring about those features. And the proponents of ID also claim positive arguments.

Critics of ID commonly argue that it is not science. For its positive predictions of the behavior of a designer they have a good point. But not for its negative criticisms of the effectiveness of natural selection, which are scientific arguments that must be taken seriously and evaluated. Look at Figure 1, which shows a cartoon design from T-shirts sold by an ID website, Access Research Network, which also sells ID paraphernalia (I am grateful to them for kind permission to reproduce it).

As the bulwark of Darwinism defending the hapless establishment is overcome, note the main lines of attack. In addition to recycled creationist themes such as the Cambrian Explosion and cosmological arguments about the fine-tuning of the universe, the ladder is Michael Behe’s argument about molecular machines (Behe 1996). The other main attack, the battering ram, is the “information content of DNA” which is destroying the barrier of “random mutation”.

The “irreducible complexity of molecular machines” arguments of Michael Behe have received most of the publicity; William Dembski’s more theoretical arguments involving information theory have been harder for people to understand. There have been a number of extensive critiques of Dembski’s arguments published or posted on the web (Wilkins and Elsberry 2001; Godfrey-Smith 2001; Rosenhouse 2002; Schneider 2001, 2002; Shallit 2002; Tellgren 2002; Wein 2002; Elsberry and Shallit 2003; Edis 2004; Shallit and Elsberry 2004; Perakh 2004a, 2004b; Tellgren 2005; Häggström 2007). They have pointed out many problems. These range from the most serious to nit-picking quibbles.

In this article, I want to concentrate on the main arguments that Dembski has used. With a few exceptions, many of the points I will make have already been raised in these critiques of Dembski — this is primarily an attempt to make them more accessible.

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DIGITAL CODES

Stephen Meyer, who heads the Discovery Institute’s program on ID, describes Dembski’s work in this way:

We know that information — whether, say, in hieroglyphics or radio signals — always arises from an intelligent source. So the discovery of digital information in DNA provides strong grounds for inferring that intelligence played a causal role in its origin. (Meyer 2006)

What is this mysterious “digital information”? Has a message from a Designer been discovered? When DNA sequences are read, can they be converted into English sentences such as: “Copyright 4004 BCE by the intelligent designer; all rights reserved”? Or can they be converted into numbers, with one stretch of DNA turning out to contain the first 10 000 digits of π ? Of course not. If anything like this had happened, it would have been big news indeed. You would have heard by now. No, the mysterious digital information turns out to be nothing more than the usual genetic information that codes for the features of life, information that makes the organism well-adapted. The “digital information” is just the presence of sequences that code for RNA and proteins — sequences that lead to high fitness.

Now we already knew that they were there. Most biologists would be surprised to hear that their presence is, in itself, a strong argument for ID — biologists would regard them as the outcome of natural selection. To see them as evidence of ID, one would need an argument that showed that they could only have arisen by purposeful action (ID), and not by selection. Dembski’s argument claims to establish this.

SPECIFIED COMPLEXITY

How does his argument work? Dembski (1998, 2002, 2004) first sets forth an Explanatory Filter to detect design. To make a longish story short, it concludes in favor of design whenever it finds Specified Complexity. He requires that the information in question be complex, so that the probability of that DNA sequence’s occurring by chance would be less than 1 in 10^{150} . Dembski chooses this value to avoid any possibility that the sequence would arise even once in the history of the universe. If this complexity were the only issue, his argument could instantly be dismissed: any random sequence of 250 bases would be about as improbable as this. Similarly, any random five-card hand in a card game has a chance of only one in 2 598 960 and this rare an event occurs every time we deal, so that the rarity is not a cause for concern.

This is where the “specified” part comes in.

The Arguments of William Dembski

Dembski requires that the information also satisfy a requirement that makes it meaningful. He illustrates this with a variety of analogies having different kinds of meaning. In effect, he is saying that the relevant quantity is the probability that a random sequence of DNA is as meaningful as the one observed.

The image on the left of figure 2 (p 22) shows an example. It is a 101-by-100-pixel image. If our specification were, say, that the image be very much like a flower, the image on the left would be in contention (not surprisingly, as it started as a digital photograph of a zinnia). Of all the possible arrangements of 10 100 black-and-white pixels, it is among the tiny fraction for which the images are much like a flower. There are 2^{10100} possible such images of this size, which is about 10^{3040} , a vast number. We do not know how many of these would look as like, or more like, a flower than this, but suppose that it is not greater than 10^{100} . That means that, if we choose an image randomly from all possibilities, the probability that an image would look this much (or more) like a flower is less than $10^{100}/10^{3040}$, which is 10^{-2940} .

The image on the right would not be in contention in any contest for images that looked like a flower. Like the left image, it has 3511 black pixels, but they seem to be arranged randomly. Both images have the same information content (10 100 bits), but the image on the left looks like a flower. It not only has information, it has information that is specified by being in a flower-like arrangement. This is a useful distinction, which Dembski attributes to Leslie Orgel. I cannot resist adding that a related concept, “adaptive information”, appears in one of my own papers, perhaps the one least frequently cited (Felsenstein 1978).

Sequences in the genome that code for proteins and RNAs, and associated regulatory sequences, have specified information. Although Dembski (2002: 148) mentions a number of possible different criteria, the one that will concern us here is fitness. Sequences contain information that makes the organism well adapted if it has high fitness, and the specified information will be judged by the fraction p of all possible sequences that would have equal or higher fitness.

(Dembski also defines specified information in another way — using concepts from algorithmic information theory and saying that information is specified if it can be described simply. A perfect sphere would then be more strongly specified than an actual organism. But this has nothing to do with fitness or with explaining adaptation. I will concentrate here on explaining adaptation.)

Specified complexity does one thing — when it is observed, we can be sure that purely random process-



FIGURE 1. A summary of the major arguments of “intelligent design”, as they appear to its advocates, from Access Research Network’s website <<http://www.arn.org>>. Merchandise with the cartoon is available from <<http://www.cafepress.org/accessresearch>>. Copyright Chuck Assay, 2006; all rights reserved. Reprinted by permission.

es such as mutation are highly unlikely to have produced that pattern, even once in the age of the universe. But can natural selection produce this specified complexity? Dembski argues that it cannot — that he can show that these strongly nonrandom patterns cannot be designed by natural selection.

To support that argument, Dembski makes two main arguments. The first involves a Law of Conservation of Information — he argues that it prevents the process of natural selection from increasing the amount of adaptive information in the genome. The second uses the No Free Lunch theorem to argue that search by an evolutionary algorithm cannot find well-adapted genotypes. Let us consider these in turn.

CONSERVATION OF INFORMATION

For his concept of the Law of Conservation of Information, Dembski points to a law stated by the late Peter Medawar. In its clearest form it states that a deterministic and invertible process cannot alter the amount of information in a sequence. If we have a function that turns one DNA sequence X into another one Y , and if this function is invertible, then there is also a reverse function that can recover the original sequence X from the sequence Y . Any information that was present in the original sequence cannot have been lost, as we can get the original sequence back.

This is fairly obviously true. For example, if we take the picture of the flower above, and scramble the order of its pixels, we destroy its resemblance to a flower. But if we did so using, say, a computer random number generator (a pseudorandom number genera-



FIGURE 2. Two 101 x 100 pixel images, each with 3511 black pixels and the rest white. Both have equal information content. Which one has specified complexity, as judged by its resemblance to an image of a flower?

tor) to make a permutation of the pixels, we could record the permutation we used, and use it at any time to unscramble the picture. The original information is conserved, because it has been hidden by the scrambling, but not really lost.

Does this mean that such a process cannot increase or decrease the amount of information in the genome? Yes, if we simply mean information, but no, if we mean specified information. Here I am disagreeing with Dembski on a critical point. In his reformulation of Medawar's theorem "the complex specified information in an isolated system of natural causes does not increase" (Dembski 2002: 169). Note that he is discussing not simply information, but specified information. Now look again at the pixelated flower. I said that the second figure had the same number of black pixels, distributed randomly. The reason I knew this is that the second picture is simply the first picture with its pixels scrambled. I generated the permutation using a pseudorandom random number generator and can easily tell you how to generate it yourself, so that you can do the scrambling yourself and get exactly the same result, and you can also make the tables needed to unscramble the picture. So no information was lost.

But the amount of specification certainly was lost. The second picture would be instantly rejected from any "like a flower" contest. When we use the permutation to unscramble the picture, we create a large amount of specification by rearranging the random pixels into a flowerlike form. We blatantly violate Dembski's version of Medawar's theorem.

DEMBSKI'S PROOF

Why am I saying this, when Dembski does sketch a proof of his Law of Conservation of Specified Complexity? How can he have proven the impossible? *He does this by changing the specification.* If the original permutation, from the first picture to the second, is called F , we can call the reverse permutation, the one that converts the second picture back into the first, G . Dembski's argument points out that the first picture has the specification "like a flower". The second picture has an equivalent specification: "when permuted by G , like a flower". For every picture that is more like a flower than the first picture, there is one that we would get when applying the permutation F

to it. That permuted picture will of course satisfy the second specification to the same extent in that, when permuted back by G , it too is more like a flower.

So both pictures have specifications that are equally strong, and that is the essence of Dembski's proof. Dembski's proof has been strongly criticized by Elsberry and Shallit (2003; Shallit and Elsberry 2004), who pointed out that it violates a condition that the specification has to be produced from "background information", and thus has to be independent of the transformations F and G . The specification of G is not.

But even if their criticism of Dembski's proof were dismissed, and Dembski's proof accepted as correct, in any case Dembski's proof is completely irrelevant. We want to explain how DNA sequences come to contain information that makes the organism highly fit (by coding for adaptations). The specification that should interest us is this one: "codes for an organism that is highly fit". Dembski is applying his proof by arguing that it shows that no random or deterministic function can increase the specified information in a genome. The permutations I have been using as examples are deterministic functions, and his theorem would apply to them. If a genome codes for a highly fit organism, so that it satisfies the specification, when it is permuted it does not satisfy it. The scrambled genome is dreadfully bad at coding for a highly fit organism. And when we use the unscrambling permutation G on it, we create the specification of the information, for this original specification which uses fitness.

The flaw in Dembski's argument is that, to test the power of natural selection to put specified information into the genome, we must evaluate the same specification ("codes for an organism that is highly fit") on it before and after. If you could show that the scrambled picture and the unscrambled picture do equally well in satisfying that same specification, you would go far to prove that natural selection cannot put adaptive information into the genome. Our flower example shows that there is a big difference in whether the original specification is satisfied before and after the permutation. Scrambling the sequence of a gene may not destroy its information content, if we have used a known permutation that can later be undone. But the scrambling certainly will destroy the functioning, and thus the fitness, of the gene. Likewise, unscrambling it can dramatically increase the fitness of the gene. *Thus Dembski's argument, in its original form, can be seen to be irrelevant.* And when put into a meaningful form by requiring that the specification we evaluate is the same one before and after, the example presented here shows his argument to be wrong.

GENERATING SPECIFIED INFORMATION

Evolution does not happen by deterministic or random change in a single DNA sequence, but in a population of individuals, with natural selection choosing among them. The frequencies of different alleles change. Considering natural selection in a population, we can clearly see that a law of conservation of specified information, or even a law of conservation of information, does not apply there.

If we have a population of DNA sequences, we can imagine a case with four alleles of equal frequency. At

a particular position in the DNA, one allele has A, one has C, one has G, and one has T. There is complete uncertainty about the sequence at this position. Now suppose that C has 10% higher fitness than A, G, or T (which have equal fitnesses). The usual equations of population genetics will predict the rise of the frequency of the C allele. After 84 generations, 99.9001% of the copies of the gene will have the C allele.

This is an increase of information: the fourfold uncertainty about the allele has been replaced by near-certainty. It is also specified information — the population has more and more individuals of high fitness, so that the distribution of alleles in the population moves further and further into the upper tail of the original distribution of fitnesses.

The Law of Conservation of Information has not considered this case. Even though the equations of change of gene frequencies are deterministic and invertible, when the gene frequencies are taken into account there is no law of conservation of information. The amount of information changes as the gene frequencies change (it can go either up or down, depending on the case). The specified information as reflected by the fitness does obey a law — in this simple case fitness constantly increases, as a result of the action of natural selection. *So the only law we have is one that does predict the creation of specified information by natural selection.* One might object that we have not actually created specified *complexity* because the increase in information has been only 2 bits, rather than the 500 bits (150 decimal digits) which is Dembski's minimum requirement for specified complexity. But what we have done is to describe the action of the mechanism that creates specified information — if this acts repeatedly at many places in the gene, specified complexity would arise. *Thus one of the two main arguments used by Dembski can be seen to be wrong, when we consider a population.*

NO FREE LUNCH?

The second pillar of Dembski's argument is his use of the No Free Lunch theorem. This gave his 2002 book its title, and Dembski (2002: xix) declares the chapter on this to be "the climax of the book". The theorem was invented by computer scientists (Wolpert and Macready 1997) who were concerned with the effectiveness of search algorithms. It is worth giving a simple explanation of their theorem in the context of a simple model of natural selection. Imagine a space of DNA sequences that has to be searched. Suppose that the sequences are each 1000 bases long. There are $4 \times 4 \times 4 \times \dots \times 4 = 4^{1000}$ possible sequences, which in alphabetic order would go from AAAA...A to TTTT...T. Now imagine that our organism is haploid, so that there is only one copy of the gene per individual, and suppose that each of these sequences has a fitness. A very tiny fraction of the sequences is functional, and almost all of the rest have fitness zero.

Suppose that we want to find an organism of high fitness, and we want to do so by looking at 10 000 different DNA sequences. The best we can do, of course, is to take the highest one we find among these. Now note that 4^{1000} is about 10^{602} , a number far greater than the number of elementary particles in

the universe. It is not unreasonable to guess that the fraction of DNA sequences that has a nonzero fitness is tiny — let's be very generous and say 1 in 10^{20} .

One way we could search would be at random. Pick one of the DNA sequences, then pick another completely at random, then another completely at random, and continue on until 10 000 different ones have been examined. As we are picking at random, each pick has essentially one chance in 10^{20} of finding a sequence with nonzero fitness. It should immediately be apparent that we have almost no chance of finding any sequence with nonzero fitness. In fact we have less than one chance in 10^{16} . So a completely random search is a really terrible way to increase fitness — it will overwhelmingly often find only sequences that cannot survive. In effect, it is looking for a needle in a haystack, and failing.

Of course, evolution does not do a completely random search. A reasonable population genetic model involves mutation, natural selection, recombination and genetic drift in a population of sequences. But we can make a crude caricature of it by having only one sequence, and making, at each step, a single mutational change in it. If the change improves the fitness, the new sequence is accepted. Suppose that we continue to do this until 10 000 different sequences have been examined. We will end with the best of those 10 000.

Will this do better? In the real world, it will if we start from a slightly good sequence. Each mutation carries us to a sequence that differs by only one letter. These tend to be sequences that are somewhat lower, or sometimes somewhat higher, in fitness. On average they are lower, but the chance that one reaches a sequence that is better is not zero. So there is some chance of improving the fitness, quite possibly more than once. A fairly good way to find sequences with nonzero fitnesses is to search in the neighborhood of a sequence of nonzero fitness.

The No Free Lunch (NFL) theorem states that if we consider the list of all possible sequences, each with a fitness written next to it *and if we average over all the ways that those fitnesses could be assigned to the sequences*, then no search method is better than any other. We are averaging over all the orders in which we could write the fitnesses down next to the list of sequences. Almost all of these orders are just like random associations of fitnesses with genotypes. That means that search by genetic mutation could not do any better than a hopelessly bad method such as complete random choice of sequences. The NFL theorem considers all the different ways fitness could be associated with genotype. The vast number of those are like random scramblings. For those assignments of fitnesses to genotypes, when we mutate a sequence by even one base, the fitness of the new sequence is the same as it would be if it were drawn at random from among all other possible sequences.

This randomization destroys all hope of finding a better fitness by mutating. Each single-base mutation is then just as bad as changing all of the bases simultaneously. It is as if we were on the side of a mountain and took one step. In the real world, this would carry us a bit up or a bit down (though sometimes over a cliff). In the No Free Lunch world, it

would carry us to the altitude of a random spot on the globe, and that would most often plunge us far downward. In sequence space the prospects are even more gloomy than on the globe, as all but an extremely tiny fraction of sequences have fitness zero, and thus they have no prospects.

The NFL theorem is correct, but it is not relevant to the real world of evolution of genomes. This point has been overlooked in some responses to Dembski's use of the theorem. For example, H Allen Orr in *The New Yorker* (Orr 2005) and David Wolpert in a review of Dembski's book (Wolpert 2003) both argue against Dembski by pointing out phenomena such as coevolution that are not covered by the NFL theorem. In effect, they are conceding that for simple sequence evolution, the NFL theorem rules out adaptation by natural selection. In arguing this way, they are far too pessimistic about the capabilities of simple sequence evolution. They have overlooked the NFL theorem's unrealistic assumptions about the random way that fitnesses are associated with genotypes, which in effect assumes mutations to have disastrously bad fitness.



MUTATIONS

In the real world, mutations do not act like this. Yes, they are much more likely to reduce fitness than to increase it, but many of them are not lethal. I probably carry one — I have a strong aversion to lettuce, which to me has a bitter mineral taste. This is probably a genetic variation in one of my odorant receptor genes. It makes salad bars problematic, and at sandwich counters I spend a lot of time scraping the lettuce off. But it has not killed me — yet. The great body of empirical information about the effects of mutation in many organisms makes it clear that a great many mutations are not instantly lethal. They do on average make things worse, but they do not plunge us instantly back into the primordial organic soup.

In Dembski's NFL argument a single base change would have the same effect, on average, as changing all the bases in the gene simultaneously. A single amino acid substitution in a protein would have the same effect as replacing the whole protein by a random string of amino acids. This would make the protein totally inactive. That changes of a single base or a single amino acid do not have this sort of effect is strong evidence that mutations are much more likely to find another almost-functional sequence nearby. The real fitness landscape is not a scrambled "needle-in-a-haystack" landscape in which a sequence of moderately good fitness is surrounded only by sequences whose fitness is zero. In the real world, genotypes near a moderately good one often have moderately good fitnesses.

EMPIRICAL EVIDENCE

Note that if Dembski's arguments were valid, they would make adaptation by natural selection of any organism, in any phenotype, essentially impossible. For that would require adaptive information to be encoded into the genome by natural selection. According to Dembski's argument we would not need to worry: bacteria infecting a patient could not evolve antibiotic resistance. Human immunodeficiency virus-

es (HIV) would not become resistant to drugs. Insects would not evolve resistance to insecticides. Dembski's designer would be busy indeed: he would need to design every last adaptation, leaving out only a few that might be purely accidental.

Dembski himself seems unable to draw this self-evident conclusion from his own argument. He acknowledges that "the development of antibiotic resistance by pathogens via the Darwinian mechanism is experimentally verified and rightly of great concern to the medical field" (Dembski 2002: 38). But by saying that he undercuts his own argument — if correct, his argument would actually prove that the adaptive information in the bacterial genome could not be created by natural selection, except by the pure accident of mutation and genetic drift, unaided by natural selection.

His argument will also be news to animal and plant breeders. They use simple forms of artificial selection such as breeding from the individuals that have the best phenotypes. These forms of selection are like natural selection in that they do not use detailed information about individual genes — they do not require a particular detailed design. Dembski's argument implies that the breeders' efforts are in vain. They cannot create changes of phenotype by artificial selection, as this should be as ineffective as natural selection. Artificial selection provided Darwin with such powerful examples that he opened his book with an entire chapter on "Variation Under Domestication" in which he discussed case after case of changes due to artificial selection, but Dembski does not discuss artificial selection at all, mentioning it only once, in passing (in Dembski [2004] it is on page 311).

SMUGGLING?

Dembski (2002, sections 4.9 and 4.10) is not unaware of arguments that smoother fitness surfaces than the needle-in-a-haystack ones would allow natural selection to be effective. For example, Richard Dawkins (1996) has a computer program to demonstrate the effectiveness of selection, which evolves a meaningless jumble of 28 letters into the phrase "Methinks it is like a weasel" by repeatedly mutating letters randomly and then accepting those offspring sequences that most closely match the target phrase. Each match improves the fitness, so that mutations that make the phrase closer are readily available. Dembski argues, however, that the information in the resulting phrase is not created by the natural selection — it is already there, in the target phrase. He calls this the "displacement problem" (2002, section 4.7).

But invariably we find that when specified complexity seems to be generated for free, it has in fact been front-loaded, smuggled in, or hidden from view. (Dembski 2002: 204)

Computer demonstrations of the power of natural selection to bring about adaptation do often have detailed targets that natural selection is to approach. It is easier to write the programs that way. In real life, the objective is higher fitness, and achieving that means having the organism's phenotype interact well with real physics, real chemistry, and real biology.

In these more real cases, the environment does not provide the genome with exact targets. Consider a population of deer being preyed upon by a population of wolves. We have little doubt that mutations among the deer will cause changes in the lengths of their limbs, the strength of their muscles, the speed of reaction of their nervous system, the acuity of their vision. Some of these will enable the deer to escape the wolves better, and those ones will tend to spread in the population. The result is a change in the design of the deer. But this information is not “smuggled in” by the wolves. They simply chase the deer — they do not evaluate their match to detailed pre-existing design specifications.

There have been computer simulations that mimicked this process. The most fascinating is that of Karl Sims (1994a, 1994b, 1994c), whose simulation evolves virtual creatures that swim or hop in intriguing and somewhat unpredictable ways. The creatures are composed of connected blocks that can move relative to each other, and they are selected only for effective movement without screening for any details of the design. All that is required is genotypes, phenotypes, some interaction between the phenotypes and an environment, and natural selection on one property — speed. There is no “smuggling”. A similar simulation inspired by Sims’s is Jon Klein’s (2002) *breve* program, available for download.

EVOLVABILITY

Dembski makes another argument about the shape of the fitness function itself. If it is smooth enough to allow evolution to succeed, he argues that this is the result of more smuggling:

But this means that the problem of finding a given target has been displaced to the new problem of finding the information *j* capable of locating that target. ...To say that an evolutionary algorithm has generated specified complexity within the original phase space is therefore really to say that it has borrowed specified complexity from a higher-order phase space ...it follows that the evolutionary algorithm has not generated specified complexity at all but merely shifted it around. (Dembski 2002: 203)

He is arguing that the fitness surface itself must have been specially chosen out of a vast array of possibilities, and that this means that one started with the specified complexity already present. He is saying that the smoothness of real fitness functions is not typical — that without a large input of specified information one would be dealing instead with needle-in-a-haystack fitness functions where natural selection could not succeed.

Now, it is possible to have natural selection alter the fitness function. There is a small literature on the “evolution of evolvability”. Altenberg (1995) showed a computer simulation where natural selection causes the extent of interaction among genes to become less, so that the genotypes tend to become ones that have a smoother fitness function.

But even this may not be necessary. Different genes often act in ways separated in space and time, and that

reduces the chance of their interacting. A mutant affecting one’s eye pigment typically does not interact with a mutant at a different gene affecting the bones in one’s toe. That isolation does not require any special explanation. But in a world that has a needle-in-a-haystack fitness function everything interacts strongly with everything else.

In effect, that world has everything encrypted. If you get a password or a lock combination partially correct, you do not partly access the computer account or partly open the safe. The computer or the safe does not react to each change by saying “hotter” or “colder”. Each digit or letter interacts with each other, and nothing happens until all of them are correct. But this encryption is not typical of the world around us. Password systems and combination locks must be carefully designed to be secure — and this design effort can fail.

The world we live in is not encrypted. Most parts of it interact very little with other parts. When my family leaves home for a vacation, we have to make many arrangements at home concerning doors, windows, lights, toilets, faucets, thermostats, garbage, notifying neighbors, stopping delivery of newspapers, and so on. If we lived in Dembski’s encrypted universe, this would be impossible. Every time we changed the thermostat setting, the windows would come unlocked and the faucets would run. Every time we closed a window, the newspaper delivery would resume, or a neighbor would forget that we were leaving. (It’s worse than that, in fact. The house would be totally destroyed.) But, as we live in the real universe, we can cheerfully set family members to carrying out these different tasks without their worrying about each other’s actions. The different parts of the house scarcely interact.

Of course a house is a designed object, but it is not particularly hard to have its parts be almost independent. When architects train, they do not have to spend much of their time ensuring that the doors, when closed, will not cause the faucets to run.

We live in a universe whose physics might be special, or might be designed — I wouldn’t know about that. But Dembski’s argument is not about other possible universes — it is about whether natural selection can work to create the adaptations that we see in the forms of life we observe here, in our own universe, on our own planet. And if our universe seems predisposed to smooth fitness functions, that is a big problem for Dembski’s argument.



BIBLIOGRAPHIC NOTE: DEMBSKI’S CRITICS

Of the major arguments here, two are, I believe, my own. One is the argument that Dembski’s Law of Conservation of Complex Specified Information could not succeed in proving that information cannot be generated by natural selection, because his Law requires us to change the specification to keep the amount of specified information the same. The other is the argument that changes of gene frequency by natural selection can increase specified information. The other major arguments will be found in some of the papers I cited. In particular, the argument that the No Free Lunch theorem does not establish that natur-

al selection cannot do better than pure random search was also made by Wein 2002, Rosenhouse 2002, Perakh 2004b, Shallit and Elsberry 2004, Tellgren 2005, and Häggström 2007.

IN CONCLUSION

Dembski argues that there are theorems that prevent natural selection from explaining the adaptations that we see. His arguments do not work. There can be no theorem saying that adaptive information is conserved and cannot be increased by natural selection. Gene frequency changes caused by natural selection can be shown to generate specified information. The No Free Lunch theorem is mathematically correct, but it is inapplicable to real biology. Specified information, including complex specified information, can be generated by natural selection without needing to be “smuggled in”. When we see adaptation, we are not looking at positive evidence of billions and trillions of interventions by a designer. Dembski has not refuted natural selection as an explanation for adaptation.

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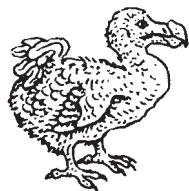
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Sorry, but we could not resist the headline opportunity. We mean, of course, that NCSE members, their friends, and their families are cordially invited to join NCSE's executive director Eugenie C Scott and NCSE's former postdoctoral scholar Alan Gishlick — our very own "Gish" — on our next wonderful NCSE trip down the Grand Canyon.

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

ABOUT THE GRAND CANYON

Hiking the Grand Canyon's Geology

by Lon Abbott and Terri Cook

For the Hiking Geology series of The Mountaineers Books, Lon Abbott and Terri Cook have produced a hiker's guide to the Grand Canyon that explains the geology in loving expert detail, literally step by step. Eighteen excursions are detailed, ranging — as the publisher writes — “from the most popular rim-to-river trails (Havasupai Canyon Trail) to gentle, half-day rim walks (Red Butte Trail) to rugged and remote multi-day backpack trips (Lava Falls Route)” and including useful information on permits, lodging and camping, and mule rides. The authors both teach at Prescott College, where they lead hiking trips to study geology in the field.

Grand Canyon Geology, second edition

edited by Stanley S. Beus and Michael Morales

From the publisher: “This second edition of the leading book on Grand Canyon geology contains the most recent discoveries and interpretations of the origin and history of the canyon. It includes two entirely new chapters: one on

debris flow in the Canyon and one on Holocene deposits in the canyon. All chapters have been updated where necessary and all photographs have been replaced or re-screened for better resolution. Written by acknowledged experts in stratigraphy, paleontology, structural geology, geomorphology, volcanism, and seismology, this book offers a wealth of information for students, geologists, and general readers interested in acquiring an understanding of the geological history of this great natural wonder.”

Grand Canyon: Solving Earth's Grandest Puzzle

by James Lawrence Powell

From the publisher: “Vast and majestic, the Grand Canyon represents one of science's most challenging puzzles: How did this massive canyon come to be? This is the story of the search for the answers, and the first account of the consensus geologists have reached in the last few years. A scientific detective tale packed with colorful characters, *Grand Canyon* follows the explorers, adventurers, and geologists whose efforts led to the understanding of the canyon's mysteries. ... An eloquent, breathtaking narrative, *Grand Canyon* is a fascinating true story that is as epic as its subject.” Powell is also

the author of *The Mysteries of Terra Firma: Exploring the Age and Evolution of the World*.

An Introduction to Grand Canyon Geology

by L. Greer Price

Geologist L. Greer Price worked for the National Park Service for ten years, mainly in Grand Canyon National Park, and his experience in explaining the geology of the canyon to the park's visitors is evident on every page of his brief (64-page) introduction, enlivened with dozens of photographs. Basic geological principles, including plate tectonics, structural features and their significance, and the role of erosion, are introduced and emphasized throughout; a glossary and a full index enhance the book's usefulness. Proceeds from the sale of the book benefit the educational programs of Grand Canyon National Park.

ABOUT DEEP TIME

The Age of the Earth

G. Brent Dalrymple

The Age of the Earth begins with a plain answer: “Four and one-half billion years.” But keep reading! Dalrymple's comprehensive, authoritative, and altogether magisterial account of the methods used

to determine the age of the earth is, according to the reviewer for *The Quarterly Review of Biology*, “an enormously important book written by an expert for the general scientific public. It is must reading for all interested in the antiquity of nature.” Dalrymple, a Supporter of NCSE and a recipient of the National Medal for Science, is Professor Emeritus in the College of Oceanic and Atmospheric Sciences at Oregon State University.

Ancient Earth, Ancient Skies: The Age of Earth and Its Cosmic Surroundings

by G Brent Dalrymple

Whereas *The Age of the Earth* was aimed at the general scientific public, *Ancient Earth, Ancient Skies* is aimed at the common reader, and it succeeds magnificently in clearly explaining the methods and results used by scientists in ascertaining the age of the earth and of the universe. Writing in *RNCSE* (2005 Jan-Apr; 25 [1-2]: 45-46), Timothy Heaton described *Ancient Earth, Ancient Skies* as “a much-needed contribution to scientific education ... [that] takes a pivotal and complex topic and makes it very easy to understand by non-scientists. ... This book deserves a place in every school and public library.”

Measuring Eternity: The Search for the Beginning of Time

by Martin Gorst

In *Measuring Eternity*, Martin Gorst provides a readable and engaging account of attempts to ascertain the age of the world. Ranging from the time of Ussher, La Peyrère, and Burnet all the way to the Hubble Space Telescope, the book provides delightful glimpses of a variety of eccentric characters devoted to the development of a scientific chronology. “The world has not only existed much longer than was once believed,” he writes toward the end of *Measuring Eternity*: “we now know that it is larger and more varied, richer and more complex, than Ussher and his contemporaries could ever have imagined.”

The Dating Game: One Man's Search for the Age of the Earth

by Cherry Lewis

“It is perhaps a little indelicate to ask of our mother Earth her age, but Science acknowledges no shame.” So quipped Arthur Holmes, one of the major figures in the history of attempts to determine the age of the earth, and the subject of Cherry Lewis's lively biography, *The Dating Game*. The reviewer for *Earth Sciences History* writes, “it is always a pleasure — and alas, not a common pleasure — to read a really well-written geological biography. Cherry Lewis is to be congratulated not only in producing one such biography, but also in setting forth with commendable lucidity the evolving scientific concepts by which the Earth's dating was achieved.”

ABOUT FLOOD GEOLOGY

Noah's Flood: The Genesis Story in Western Thought

by Norman Cohn

With the aid of 75 illustrations, including 20 color plates, the distinguished medieval historian Norman Cohn explores the origins, development, and variety of interpretations of the familiar tale of the Noachian deluge. Writing in *Nature*, the historian of geology Martin Rudwick described *Noah's Flood* as “[a]n attractive brief survey of the fortunes and uses of the Flood story, ranging from ancient Mesopotamia to the equally alien territory of twentieth-century American creationism ...” and commended it to “anyone with an interest in the historical roots of modern scientific study of the Earth.” The author is the Astor-Wolfson Professor Emeritus of History at the University of Sussex.

Genesis and Geology

by Charles Coulston Gillispie

Subtitled “A study in the relations of scientific thought, natural theology, and social opinion in Great Britain, 1790-1850”, *Genesis and Geology* “proposed to give an account of the immediate background of the pattern of scientific disagreement which culminated in disputes about Darwin's book and to attempt to analyze the causes of

that disagreement.” Originally published in 1951, *Genesis and Geology* was reprinted by Harvard University Press in 1996, with a new introduction by the historian of geology Nicolaas Rupke re-evaluating the book in light of the subsequent forty-five years of historical scholarship.

The Creationists

by Ronald L Numbers

Reissued in 2006 with new chapters on the global spread of creationism and the advent of the “intelligent design” movement, Ronald L Numbers's monumental study remains the pre-eminent work on the history of creationism — and on the history of flood geology. “There is, of course, no simple answer to the question ‘Why flood geology?’”, Numbers explains. “But the testimony of countless converts suggests that the lion's share of credit — or blame — for the popularity of flood geology must go to John C Whitcomb Jr and Henry M Morris, who in *The Genesis Flood* gave George McCready Price's Adventist flood theory a proper fundamentalist baptism and then skillfully promoted it as biblical orthodoxy.”

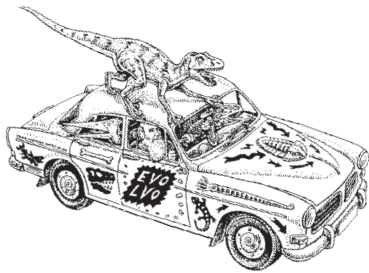
When the Great Abyss Opened:

Classic and Contemporary

Readings of Noah's Flood

by J David Pleins

In his lively, ambitious, and engaging study, Pleins — Professor of Religious Studies at Santa Clara University — investigates the cultural significance of the story of Noah's flood, discussing the connections and conflicts among geology, archeology, myth, literature, the Bible, and popular culture (A chapter is devoted to “Fundamentalist literalism and ‘creation science’”). Michael Ruse writes, “This fascinating book opens up a completely new light on a topic about which we all think we know something and about which we learn we knew very little. One of the great myths of Western culture is seen in a completely fresh light, thanks to the labors of J David Pleins.”



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DATE November 28 through December 1, 2007
CITY Atlanta GA
PRESENTER NCSE Staff
TITLE [Booth in the exhibit hall]
EVENT NABT annual meeting
TIME While exhibit hall is open
LOCATION Hyatt Regency, Atlanta
CONTACT Carrie Sager, sager@ncseweb.org

DATE December 17, 2007
CITY New Haven CT
PRESENTER Eugenie C Scott
TITLE Where the Buck Stops: Who Teachers the Teachers?
EVENT A talk in the MB&B Seminar Series
TIME 4:00 PM
LOCATION Department of Molecular Biophysics and Biochemistry, Yale University
CONTACT Lynne Regan, lynne.regan@yale.edu

DATE January 3-5, 2008
CITY San Antonio TX
PRESENTER NCSE Staff
TITLE [Booth in the exhibit hall]
EVENT Annual Meeting of the Society of Integrative and Comparative Biology
TIME While exhibit hall is open
LOCATION Gonzalez Convention Center
CONTACT Carrie Sager, sager@ncseweb.org

DATE February 9, 2008
CITY Tallahassee FL
PRESENTER Eugenie C Scott
TITLE What Do Creationists Know About Darwin?
EVENT FSU Darwin Day Celebration
TIME TBA
LOCATION TBA
CONTACT Eugenie C Scott, scott@ncseweb.org

DATE February 10, 2008
CITY Knoxville TN
PRESENTER Eugenie C Scott
TITLE What Would Darwin Say About Modern Creationism?
EVENT 12th Annual University of Tennessee Darwin Day Celebration
TIME TBA
LOCATION TBA
CONTACT Rachel Goodman, rgoodma3@utk.edu

DATE March 28, 2008
CITY Boston MA
PRESENTER Eugenie C Scott
TITLE After Dover: The New Creationism
EVENT NSTA 2008 National Conference
TIME 3:30 PM
LOCATION Boston Convention Center
CONTACT Delores Howard, dhoward@nsta.org

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

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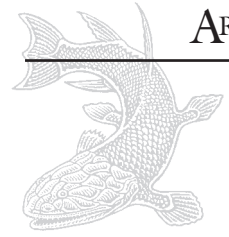
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Recurrence of the Same? “Intelligent Design” and the Biology Classroom

Jason Borenstein

In the ongoing and complex issue of teaching evolution in public schools, “intelligent design” (ID) purports to overcome objections to inserting religion into science classrooms and to illustrate conceptual and empirical shortcomings in evolutionary theory. ID supporters argue that students should be made aware of these shortcomings and suggest that “alternatives to evolution” need to be taught. A key issue that needs to be resolved is whether it is a sound pedagogical approach to teach “design” alongside evolution, which may in part be resolved by helping policy makers determine whether ID is a true rival to evolutionary theory — or has any scientific merit at all.

Even though creationism, in its various forms, has typically failed to pass legal muster, the Supreme Court has not categorically forbidden biology teachers from discussing “alternatives to evolution” as long as those lessons do not cause religion and science to be overly intertwined. ID supporters and other critics of evolution typically latch on to the *Edwards v Aguillard* ruling to provide legal grounds for introducing challenges to evolution in the classroom. According to the *Edwards* Court, “teaching a variety of scientific theories about the origins of humankind to schoolchildren might be validly done with the clear secular intent of enhancing the effectiveness of science instruction” (*Edwards v Aguillard* 482 US 578 [1987]: 594). In accordance with their interpretation of this case and other legal precedents, ID supporters seek to take advantage of a “legal opening” to offer what they argue is a secular, scientific body of claims.

Although the teaching of ID has not been specifi-

cally required in accordance with most states’ science standards, several state school boards and legislatures have considered implementing proposals that would encourage teachers to discuss evidence against evolution (Carroll 2005; Taylor and MacDonald 2002). In Ohio, the state school board explicitly considered incorporating it into the curriculum (Stephens 2004). Missouri’s legislature has considered a bill that would require teachers to discuss alternatives to evolution (Anonymous 2004). The school board in Dover, Pennsylvania, became the first one to *mandate* that ID be taught as part of the biology curriculum (Raffaele 2004). Yet a federal judge has since invalidated Dover’s policy. At this point, the Discovery Institute, one of the main organizations defending the notion that ID is a credible scientific theory, is not openly advocating that it should be a mandatory part of biology education (Meyer 2002), opting instead for tactics that try to cast doubt on the validity of evolution.

“TEACH THE CONTROVERSY”

One of the main arguments in support of teaching ID in public schools is that students need to be aware of the controversy circulating around evolution. If portions of evolutionary theory are truly on shaky ground, then ID supporters suggest that students need to be made aware of this fact. This is the so-called “teach the controversy” approach. Since ID supporters argue that there is substantial evidence contradicting at least some of the claims supporting evolution, students should be apprised of the situation and then make up their own minds on what is true. Further, even if there is evidence to support evolution, students need to be cautioned against merely assuming that it is “fact” just because it is presented in a classroom. According to ID supporters, there is momentum behind the “teach the controversy” approach as evidenced by a document that contains signatures from scientists who believe there are flaws contained within Darwinism (Discovery Institute 2001). Yet the “teach the controversy” approach, as articulated by Stephen Meyer (Meyer 2002), is profoundly misguided.

To begin, Meyer contends, “When two groups of expert disagree about a controversial subject that intersects the public school curriculum students

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should learn about both perspectives” (Meyer 2002). According to Meyer:

In such cases teachers should not teach as true only one competing view, just the Republican or Democratic view of the New Deal in a history class, for example. Instead, teachers should describe competing views to students and explain the arguments for and against these views as made by their chief proponents.

Yet it is not possible to present students with each and every dispute that is ongoing within the expert communities, let alone every dispute that is ongoing between scientists. It would be arduous and impractical to cover, as Meyer’s logic implies, each particular political party’s arguments, such as the ones offered by libertarians, socialists, the Green Party, and the Reform Party, on each controversial political issue. In other words, there are numerous other options beyond “both perspectives” offered by Democrats and Republicans that could be mentioned with reference to the issue. Further, we would certainly want to disregard the opinions of some groups, such as white supremacists and neo-Nazis, even if they do offer a “competing view” on politics. Not every “competing view” warrants consideration even though some might consider them to be rivals.

ID supporters defend the notion that students need to be made aware of “the controversy” in part because they see ID as being among the main candidates to be covered alongside evolution. Yet the logic of Meyer’s argument opens the door to discussing various alternative views on the history of life, such as the one offered by the Raëlians that human life emerged on this planet through cloning procedures undertaken by human-like aliens. The Raëlian view is undoubtedly a “rival” (in some sense of the term) to evolution since it attempts to explain how human life on this planet emerged; it does challenge a number of evolution’s tenets. Raëlians proclaim that they can offer a competing explanation for how life began and that their view merits serious consideration. As a result, the “teach the controversy” approach implies that such a view would not be discounted as a candidate to be discussed in biology classrooms, which is a profoundly troubling consequence.

Introducing students to each and every rival view as it emerges, such as the one offered by the Raëlians, can give them the wrong impression that each expert’s or group’s opinion is of equal worth and has the same level of supporting evidence behind it. In accordance with the goal of teaching students about controversies, teachers could plan lessons on witchcraft, astrology, and tealeaf reading, as Paul Feyerabend suggests (Feyerabend 1975), because there are inquirers who use these approaches in order to acquire evidence. Yet there are good compelling reasons to resist this type of thinking, which in part relates to the value and importance of obtaining evidence to support claims before students learn about them. There are plenty of individuals who purport to be “scientific” experts, but the mechanisms of science need time to evaluate and assess the relevant theories in question.

It can be unwise to present an expert’s arguments until relevant claims have been thoroughly examined by other experts. The implication that rival views are all on even grounds scientifically (have the same level of supporting evidence) does a disservice to how science works.

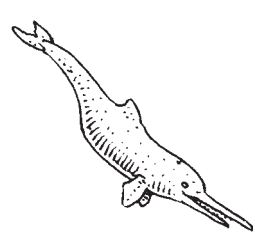
Thomas Murray describes a similar phenomenon within the context of debates over embryonic stem cell research (Murray 2001). As Murray points out, the manner in which disputes about science are typically presented to the public and to policy makers — by inviting one or two scientists on opposite sides of the spectrum to speak — implies that scientists are evenly divided on an issue. This approach can grossly distort how much consensus there actually is within the scientific community about an issue such as stem cell research. Similarly, if the views of a biologist and an ID supporter are presented at the same forum, it could mislead the audience to think that the scientists themselves are split, for example, on the issue of whether evolution is accepted as fact. Applying this insight to the classroom, presenting “both perspectives” to students implies that each one is on equal footing and that scientists are evenly divided into the two camps. Recognizing this implication does not necessarily prove that ID is false, but the biology curriculum needs to reflect accurately its standing within the scientific community.

DISPUTING EVOLUTION

Meyer and other ID supporters contend that there is active scientific “controversy” about whether evolution’s key tenets are supported by evidence. Yet labeling it as a “controversy” about evolution is misleading because the disputes are not primarily *within* the scientific community. The controversy occurs among religious groups, politicians, parents, and advocacy groups. Disputes about whether evolution is a “fact” frequently are waged at school board meetings and at legislative sessions by these groups, but not among scientists in relevant disciplines.

There are of course active disputes within scientific communities regarding the specific mechanisms governing evolution, including the issue of how significant the role of natural selection is. There have also been debates about the tempo of evolutionary change (for example, Eldredge and Gould 1972) and the unit of selection (Sachs and others 2004). Although biologists ardently disagree on some of the details of how evolution works, they are largely convinced that it did in fact occur. According to the National Science Teachers Association, “There is no longer a debate among scientists about whether evolution has taken place” (NSTA 2003). Thus, couching the issue as a “scientific” controversy between the scientists themselves misrepresents how divided the scientific community actual is on the issue. For example, according to Chad Edgington (Edgington 2004):

...given the diversity of belief on the subject and the lack of accepted, substantiated evidence supporting any theory, whether one is a creationist or an evolutionist is largely a matter of opinion.



Vocal proponents of “intelligent design”, such as Michael Behe and William Dembski, offer passionate defenses of their views, but they are noticeably on the outside of the scientific community. Neither creationism nor “intelligent design” is considered to be a viable alternative to evolution by most scientists. Scientists vehemently and consistently challenge the notion that evolution still needs to overcome the burden of proof to vanquish either “rival” theory.

THE PUBLIC FAVORS IT

The “teach the controversy” approach also takes advantage of the notion that the public seems comfortable with teaching “alternatives to evolution” along with the theory. There is some basis for Meyer’s statement that “voters overwhelmingly favor this approach” (Meyer 2002). For example, according to one Gallup poll, 68% of Americans favor teaching both creationism and evolution in biology classrooms (Moore 1999). A Zogby poll suggests that 71% of Americans would prefer that evidence both for and against evolutionary theory be taught (Zogby International 2001). However, even though Meyer’s assertion about public opinion may be accurate, it is not necessarily sound educational policy to allow the public to dictate what is taught within a discipline, especially in the sciences where extensive knowledge of technical concepts and background information is typically needed before claims can be properly assessed.

Along these lines, there is evidence to indicate that the public’s understanding of science may be inadequate (National Science Board 1998; National Science Board 2000; Russell 1994; Sanchez 1997). For example, many individuals operate with the misconception that antibiotics can help treat a viral infection and that having a flu shot immunizes against the various different strains of the virus. For some time, the public believed that AIDS only affected homosexual populations and later that it could be contracted through casual contact. But it would be profoundly dangerous if these beliefs were perpetuated by teachers, because they are false. Accordingly, ID should not be taught to students *merely* because the public demands it. It should be discussed *only* if ID proponents succeed in convincing the scientific community that ID has supporting evidence behind it.

PROMOTING “GOOD PEDAGOGY”

It has been commonly argued within the context of the “teach the controversy” approach that “academic freedom” (Hacker 2004) and “good pedagogy” (Meyer 2002) demand that alternatives to evolution be taught. It is ironic that ID supporters appeal to these notions to support the inclusion of anti-evolution evidence, considering that biology teachers avoid teaching lessons pertaining to evolution because they fear reprisal from politicians and from parents (Jacoby 2005). Some school administrators have even recommended to teachers that they sidestep the topic (Dean 2005). Further, the Georgia State Superintendent of Schools, Kathy Cox, temporarily removed the term “evolution” from Georgia’s science standards “to give

teachers some leeway to teach it without having to use a word that antagonizes some parents,” (Tofig 2004). In Dover, Pennsylvania, an administrator had to read the district’s policy on “intelligent design” to students because teachers refused to do so (Anonymous 2005).

A profound cost associated with distorted arguments against evolution is that widespread misunderstanding about and ignorance of evolutionary theory endure. According to a study by Lawrence Lerner, evolution is poorly treated in the state science standards of at least a third of US states (Lerner 2000). It seems to be the case that American students do not receive adequate instruction about the fundamentals of evolution and do not appreciate how integral evolution is to numerous scientific and non-scientific fields. As a result, misconceptions about evolution are abundant, including the notion that humans are merely a product of “random chance”, that evolution is inconsistent with laws of thermodynamics, and that there are no transitional fossils (Rennie 2002).

This is not to say that evolutionary theory is untouchable. As mentioned previously, there are certainly active controversies about evolution and gaps in biologists’ explanations. Rather, it is to assert that evolution must be understood thoroughly by students before its merits can truly be assessed. Yet since many students may only be learning a caricature of evolution or perhaps nothing substantive about it, teaching them about challenges to evolution might not be very meaningful (Moore 2001).

IS THE PROPOSED SOLUTION WORSE THAN THE ALLEGED ILLNESS?

Even though the “teach the controversy” approach has its flaws, the question still remains whether it is warranted to discuss “intelligent design” specifically in biology classrooms. ID proponents contend that their view is scientific and thus should be taught alongside evolution. They claim that design arguments are more attuned to scientific evidence than older versions, including the ones offered by William Paley. Indeed, instead of doing original research, ID proponents have dedicated much time and effort to identifying problems with evolution and suggesting how design might be compatible with a scientific picture of the world.

However, it is difficult, if not impossible, to disentangle ID from discussions about religion. Even if ID proponents could be taken at their word that ID could be taught without religious overtones (Behe 2005), questions about the designer will inevitably emerge. Metaphysical and religious assumptions built into any version of ID are not easily separable from the “scientific” lessons that would be offered to students. For example, one of the chief assumptions built into current formulations of “intelligent design” is that the designer is a single entity or “intelligent agent”, which means that some contemporary views about the nature of the designer(s) are dismissed. Of course, monotheism tends to be the preferred view of ID supporters but one could legitimately question whether that assumption should be granted and whether it is appropriate to allude to *one* subset of religious views at exclusion of others. As Hume asks, “Why may not



several Deities combine in contriving and framing a World?" (Hume 1779: 192).

Discussion of ID in a classroom opens, perhaps unintentionally, the door to religious conversation about the identity and traits of the designer. Yet it is not clear that it would be wise for biology teachers to stray into religious instruction. Even if a biology teacher can successfully dodge questions about the nature of designer, how will teachers explain the causal mechanisms of the design process? ID proponents do not offer much in the way of an explanation. Creationists, for example, offer a forthright and direct answer on this issue. Duane Gish "bites the bullet", so to speak, and argues, "We cannot discover by scientific investigations anything about the creative processes used by the Creator" (Gish 1979: 40).

Assuming that evolution is accepted to some degree, which ID proponents largely say that they do, at what point do the designer's actions end and evolution begin? One potential hypothesis is that the designer was involved in the initial formation of the universe and that ended the designer's role. Another hypothesis is that the designer is continually involved in designing the universe. Alternatively, the designer may act intermittently. On what basis should a biology teacher (or any human for the matter) distinguish between these competing explanations? Yet it seems crucial that we have some means to sort through these explanations if ID is to help us understand better how the universe works.

CONCLUSIONS

When the issue of evolution emerges in the classroom, students should not be left with the impression, with which much of the current debate might leave them, that evolution is scientifically "controversial" and that it is the only area of science where scientists themselves have disputes. In all these issues, the current crop of "intelligent design" proposals significantly misleads students regarding the nature of science and the evidence for evolution. Teaching that evolution is dubious or controversial within the sciences does the students a disservice because the "controversy" is over how science is to be understood and applied in modern society.

If the outgrowth of the legal, religious, and scientific disputes about evolution leads to the emergence of a high school class dedicated to the intersection of science and values, that would be a welcomed addition. Considering how central science is to our lives and how often its social, moral, and religious implications are not examined thoroughly enough, a class that looks at the broader aspects of scientific disputes might be a wise — and desirable — approach.

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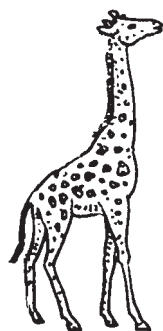
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The Design Revolution?

HOW WILLIAM DEMBSKI IS DODGING QUESTIONS ABOUT “INTELLIGENT DESIGN”

Mark Perakh

Who is William A Dembski? We are told that he has PhD degrees in mathematics and philosophy plus more degrees—in theology and what not — a long list of degrees indeed (Dembski 1998: 461).

We all know, however, that degrees alone do not make a person a *scientist*. Scientific degrees are not like ranks in the military where a general is always above a mere colonel. Degrees are only a formal indicator of a person's educational status. A scientist's reputation and authority are based only to a negligible extent on his degrees. What really attests to a person's status in science is publications in *professional* journals and anthologies and references to one's work by colleagues. This is the domain where Dembski has so far remained practically invisible. All his multiple publications have little or nothing to do with science. When he writes about probability theory or information theory — on which he is proclaimed to be an expert — the real experts in these fields (using the words of the prominent mathematician David

Wolpert [2003]) “squint, furrow one's brows, and then shrug.”

When encountering critique of his work, Dembski is selective in choosing when to reply to and when to ignore his critics. His preferred targets for replies are those critics who do not boast comparable long lists of formal credentials — this enables him to dismiss the critical comments contemptuously by pointing to the alleged lack of qualification of his opponents while avoiding answering the essence of their critical remarks. (See, for example, Dembski's replies to some of his opponents [Dembski 2002b, 2002c, 2002d, 2003a].) These replies provide examples of Dembski's overarching quest for winning debate at any cost rather than striving to arrive at the truth. For example, in his book *No Free Lunch* (Dembski 2002a), he devoted many pages to a misuse of Wolpert and Macready's (1987) No Free Lunch (NFL) theorems. (Some early critiques of Dembski's interpretation of the NFL theorems appear in Elsberry [1999, 2001]. A detailed analysis of Dembski's misuse of the NFL theorems is given, in particular, in Perakh [2004a].)

Dembski's faulty interpretation of the NFL theorems was strongly criticized by Richard Wein (2002a) and by David Wolpert (2003), the originator of these theorems. Dembski spared no effort in rebutting Wein's critique, devoting to it two lengthy essays (Dembski 2002b, 2002c). However, he did not utter a single word in regard to Wolpert's critique. It is not hard to

see why. Wein, as Dembski points out, has only a bachelor's degree in statistics — and Dembski uses this irrelevant factoid to deflect Wein's well-substantiated criticism. He does not, though, really answer the essence of Wein's comments and resorts instead to *ad hominem* remarks and a contemptuous tone. (Wein 2002b replies.) He cannot do the same with Wolpert who enjoys a sterling reputation as a brilliant mathematician and who is obviously much superior to Dembski in the understanding of the NFL theorems of which he is a co-author. Dembski pretends that Wolpert's critique does not exist.

Dembski has behaved similarly in a number of other situations. For example, the extensive index in his latest book *The Design Revolution: Answering the Toughest Questions About Intelligent Design* (Dembski 2004a) completely omits the names of most of the prominent critics of his ideas. Totally absent from the index to the book are the following names of serious critics: Rich Baldwin, Eli Chiprout, Taner Edis, Ellery Eels, Branden Fitelson, Philip Kitcher, Peter Milne, Massimo Pigliucci, Del Ratzsch, Jeff Shallit, Niall Shanks, Jordan H Sobel, Jason Rosenhouse, Christopher Stephenson, Richard Wein, and Matt Young. All these writers have analyzed in detail Dembski's literary output and demonstrated multiple errors, fallacious concepts, and inconsistencies which are a trademark of his prolific production. (I have not mentioned myself in this list

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although I have extensively criticized Dembski both in web postings [Perakh 2002, 2003a, 2003b, 2003c] and in print [Perakh 2004a, 2004b]; he never uttered a single word in response to my critique, while it is known for a fact that he is familiar with my critique; the above list shows that I am in good company.)

Thomas D Schneider, another strong critic of Dembski's ideas, is mentioned in the index of *The Design Revolution* but the extent of the reference is as follows:

Evolutionary biologists regularly claim to obtain specified complexity for free or from scratch. Richard Dawkins and Thomas Schneider are some of the worst offenders in this regard.

Contrary to the subtitle of Dembski's book — *Answering the Toughest Questions About Intelligent Design* — this remark can hardly be construed as an answer to Schneider's questions. But even this is more of a mention than most serious critics get from Dembski.

Essentially, all the critics listed above have asked Dembski a number of specific questions regarding his concepts. The absence of any replies to the listed authors suggest that the title of Dembski's new book should have properly been *The Design Revolution? Dodging Questions about Intelligent Design*. Is Dembski also of the opinion that selectivity in choosing when to respond to opponents and when to pretend they do not exist is compatible with intellectual honesty?

PREMATURE REPORTS OF THE DEMISE OF "DARWINISM"

One of beloved themes of Dembski's diatribes is his claims that "Darwinism" (the creationists' term for evolutionary biology) is either dying or is already dead (see for example Dembski 2004a). In that assertion, Dembski joins a long list of "Darwinism"'s deniers who started making such claims almost immediately after Darwin published his magnificent *On the Origins of Species*. Predictions that "Darwinism" (read: evolutionary biology) will very soon be completely abandoned by the majority

of scientists, claims that it has already died, assertions that it cannot withstand new discoveries in science — all this stuff has been a regular staple of the anti-Darwinian crowd for 148 years (see Morton 2002). Despite all these claims, evolutionary biology is alive and well and the evidence in favor of most of the Darwinian ideas is constantly growing.

Dembski asserts time and time again that evidence favoring "Darwinism" was always weak and that new discoveries make it less and less plausible. His claim (bolstered by the Discovery Institute's so-called "Scientific Dissent from Darwinism" advertisement), concludes that this lack of evidence is causing more and more biologists to abandon Darwinian ideas. In fact, he is proclaiming something he desperately *wants* to be true but that in reality is utterly false — at least if the evidence from the current research literature is any indication. It is hard to believe Dembski himself does not know that his claims are false. Indeed, Dembski is well aware of Project Steve (Dembski 2003b), conducted by the National Center of Science Education (http://www.ncseweb.org/resources/articles/3541_project_steve_2_16_2003.asp). This endeavor by NCSE has unequivocally demonstrated that the overwhelming majority of scientists, and more specifically of biologists, firmly support evolutionary biology based largely on Darwinian principles. According to these data, the ratio of scientists who are firm supporters of the neo-Darwinian synthesis to those who doubt the main tenets of modern evolutionary biology is estimated, as of March 10, 2004, to be about 142 to 1. Dembski knows about this ratio and even tried to dismiss its significance (Dembski 2003b) by asserting that Project Steve was "an exercise in irrelevance" because the support of evolution by the majority of scientists is "obvious" anyway and was not disputed. It is remarkable that such a statement plainly contradicts Dembski's incessant claims in his other writing about scientists' allegedly abandoning "Darwinism" in droves; this contradiction apparently does not make Dembski

uncomfortable. Of course self-contradictory claims in Dembski's output are too common to be surprising.

Dembski is a relatively young man and will most probably continue emanating repetitious philippics against "materialistic science" for many years to come. Science is not impressed, though (and hardly will be), by a relabeled creationism, supported not by evidence but only by casuistry in a pseudo-mathematical guise. (The purely religious motivation underlying Dembski's relentless attacks on evolutionary biology — in which he has no training or relevant experience — and on "materialistic science" in general is obvious from his numerous statements to non-scientific audiences — see, for example, Dembski 2004b, in which he told his audience, "When you are attributing the wonders of nature to these mindless material mechanisms, God's glory is getting robbed").

A SCIENTIFIC REVOLUTION?

In his latest book, Dembski (2004a) says:

I take all declarations about the next big revolution in science with a stiff shot of skepticism. Despite that, I grow progressively more convinced that intelligent design will revolutionize science and our conception of the world (p 19).

Is the Design Revolution, so boldly forecast by Dembski, indeed imminent? I suspect that Dembski is in for a deep disappointment. He may continue generating noise within the shadow region underneath science, but at some point in the future all this brouhaha that "intelligent design" allegedly will replace "materialistic science" most probably will result in adding one more item to the amusing collection of absurdities that already contains Barrow and Tipler's Final Anthropic Principle with its prediction of a never-dying intelligence (Barrow and Tipler 1986; Gardner 1986), Tipler's further prediction of the imminent resurrection of the dead as computer-reincarnated entities (Tipler 1994), homeopathic quasi-



medicine, and other fads and fallacies that so easily earn cheap popularity among the benighted crowds. Paradoxically, these “scientific revolutions” occur regularly in the same country where efforts by the avant garde of honest scientists and inventors lead the world in the progress of technology and genuine science. Dembski’s work may be remarkable among these only in its quantity.

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TEACHING EVOLUTION BETTER

A special issue of the *McGill Journal of Education* (vol 42, no 2) focusing on evolution education is now freely available on-line. In their preface, the issue’s editors, Jason Wiles of McGill University and Anila Asghar of Johns Hopkins University, write:

the teaching and learning of evolution has faced difficulties ranging from pedagogical obstacles to social controversy. These include two distinctive sets of problems: one arising from the fact that many evolutionary concepts may seem, at least initially, counterintuitive to students, and the other deriving from objections rooted in religion. Despite the overwhelming acceptance of evolution among scientists and despite evolution’s centrality to modern biology, virtually all national polls indicate approximately one-half of North Americans reject evolution — suggesting that they think scientists, textbooks, and teachers are simply wrong.

Three themes are emphasized throughout the issue: “the need for improved teacher training in pedagogical techniques and content knowledge with regard to evolution, the need for effective classroom tools for teaching evolution, and the need to confront specific issues related to social controversies surrounding evolution education.”

Contributors include Randy Moore; Anila Asghar, Jason R Wiles, and Brian Alters (a member of NCSE’s board of directors); Robert T Pennock; Judy Scotchmoor and Anastasia Thanukos; Jeff Dodick; and NCSE’s executive director Eugenie C Scott. Also included are opinion pieces by Craig E Nelson and Massimo Pigliucci and book reviews by NCSE’s deputy director Glenn Branch and Andrew J Petto (the editor of *Reports of the National Center for Science Education*). To read their various articles, visit <<http://mje.mcgill.ca/issue/view/54>>.



Responding to ID in a Freshman College Class

Jack Keyes and Nancy Brosnot

INTRODUCTION

For several years we have taught a course, *Science as a Candle in the Dark*, to help students deal with questions about the foundations of their belief systems and to promote science and skepticism as a way of inquiry. Our goal was to help students learn how to challenge ideas in a constructive manner that would lead to further insight and understanding. We examine issues where religion and science tend to interdigitate. Another goal was to help students begin to understand ambiguities that arise when religion and science seem to conflict. We take no religious position in this class; the students have a right to their own beliefs and religious views. We emphasize the differences between science and religion. We discuss the conflict between evolution and creationism to focus attention on problems that seem to arise between these two domains.

The majority of our first-year students are creationists whose beliefs span the spectrum from young-earth creationism to "intelligent design" (ID). They have been told evolution is "only a theory" with troubling gaps that scientists do not acknowledge. Part of the problem is that many public

schools ignore evolution, and teachers are afraid to broach it. One high school biology teacher in Oregon said he would not touch it with a ten-foot pole. Another said she uses only the word "change"—the word "evolution" is not used in her classes. This seems to be a common experience in our state and perhaps throughout the US. We have found that most of our incoming students were woefully ignorant of evolution. The only place most students were exposed to evolution concepts was in biology classes, but frequently not until they enrolled in college level courses. Even after learning about evolution, some students remained unconvinced. We have students in our program who memorize everything about evolution needed to pass a test, but state flatly they do not "believe in" evolution.

We try to help our students to understand the issues surrounding this divisive artificial controversy. In our classroom, we have advantages over other venues. First, we have a captive audience and adequate time to explain the science behind evolution and argue against creationism. Second, the seminar is not a biology class, so we do not sacrifice critical science content for this issue. Finally, we have the advantage of having sufficient time to discuss evolution and religious beliefs in the classroom; we are not confined to sound bites and a 5- to 20-minute terse counterargument. We have time to educate the audience.

APPROACH TO THE COURSE

Science as a Candle in the Dark examines the issues of evolution versus creationism. Until recently, we presented evidence for evolution, but gave no time for presenting creationist or ID views. Students are assigned readings from Carl Sagan's *The Demon-Haunted World* (1996), Stephen

Jay Gould's *Rocks of Ages* (1999), Chet Raymo's *Skeptics and True Believers* (1998), and an article on evolution by Ernst Mayr. This year we are adding Edward J. Larson's *Summer for the Gods* (1997) to provide more extensive historical background. We give about six hours of lecture on the subject of evolution itself including the history of evolutionary thought, as well as evidence for evolution. We present clear arguments for evolution to help students understand what evolution is. We have had success with more than half of our students as evidenced by them questioning creationist explanations because of the class. Unfortunately, we do not persuade them all; many true believers do not budge despite our efforts.

We begin reading from Sagan's book. This taps into students' sense of awe and wonder of their world and begins their education in skepticism. We emphasize the careful and precise use of definitions and concepts. When we bring up the concept of skepticism, we help students understand that skepticism is not pejorative. We teach them to differentiate between skepticism and cynicism as part of their vocabulary. Using Sagan's examples, we illustrate how easy it is for them to be gullible and believe everything they hear or read in popular media. We emphasize that skepticism is a tool to separate factual knowledge and ideas from misinformation. We introduce them to Sagan's Baloney Detection Kit, an excellent tool students can use when evaluating ideas.

In our discussions, we explain that religion is a different domain from science. We classify the paradigms (Gould's Non-Overlapping Magisteria) of religion and science as Type I and Type II teaching disciplines or knowledge. Type I is reli-

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gious belief or knowledge based in faith, not evidence; it is a philosophical construct evolving from the suppositions of faith. We explain this kind of knowledge is not wrong or bad; it is just a different magisterium from that of science. We give several examples of different kinds of Type I beliefs, but avoid discussing which, if any, are correct, pointing out that such views are typically faith-based and not something we can debate. We emphasize that Type I beliefs cannot be tested using scientific methods.

We define Science as Type II knowledge, which is testable and based in evidence, not faith. We define science as a method of inquiry so it is not misinterpreted as just another religion. We emphasize that science, unlike Type I knowledge, uses skepticism as one of its tools. We define and distinguish between the concepts of hypotheses, theories, and scientific laws. It is too easy for proponents of creationism to talk about creationist or ID theories, implying these are scientific theories, when they are Type I beliefs with no testable supporting hypotheses. Using clear definitions and making sure that students use words correctly in our discussions helps us to clarify real issues in evolutionary science. Clear understanding of terminology sets limits about the discussions that follow.

Using Type I and Type II terminology avoids some of the emotional pitfalls associated with words such as faith, religion, and evolution. This helps defuse the animosity some students have toward science and scientists. Because many fundamentalists see scientists as atheists, we want to avoid the dismissal of our teaching just because students think we do not share the same worldview. We refer to Kenneth Miller's *Finding Darwin's God* (1999) as evidence that not all scientists are atheists. We try to defuse stereotypes and keep students interested and open to new ideas.

We review several articles that help students to begin developing skeptical skills. They read about and challenge ideas such as therapeutic touch and the use of polygraphs as lie detectors, and learn how courts of law misinterpret science because the judiciary often

lacks adequate science knowledge or proper expert testimony.

Assigned readings from *Skeptics and True Believers* by Chet Raymo gives students a sensitive view of how one scientist looks at the universe from a perspective of gentle skepticism and wonder. The first contact with the subject of evolution is from Raymo's book. We show *Inherit the Wind* with Spencer Tracy and Frederic March playing the protagonists. Whereas the film distorts what really took place, it accurately describes the emotional tone permeating the current debate about evolution. We want students to get the drama from the Scopes Trial and understand what creationists mean when they say "Scopes Monkey Trial". True believers in the class squirm with the portrayal of fundamentalists in the film. We take advantage of this discomfort by asking them if the film expresses how they feel. Typically, they deny such feelings, and this gives the opportunity to question what the issues really are. We point out the real issue: Type I beliefs from religion cannot explain ideas and theories in the Type II magisterium of science and vice versa. That issue is blurred in creationist arguments.

Students are then assigned readings from Gould's *Rocks of Ages* that explain what really happened in Dayton, Tennessee, in 1925. The farcical part of the issue becomes clearer and students are amused at what really happened. This is followed with six hours of lecture on the history of evolutionary thought, the evidence for evolution, and the history of life on Earth. During and following the presentation, students are encouraged to ask questions about evolution.

Next, students read Greg Easterbrook's article "The new fundamentalism" (2000). In this cleverly written opinion piece, Easterbrook advocates "teaching the controversy", the darling of the ID movement. He also advocates changing the definition of science from natural explanations to logical explanations. He expresses a cynical view of biologists and attacks biologists openly. We ask students to write two responses to the article. One must agree with Easterbrook's contentions and state

why. The other takes the opposite position. The purpose is to encourage students to articulate in writing and discussions their understanding of the issues. This assignment helps students evaluate their own beliefs and separate science from religion. It also provides insight into how ID proponents distort and twist arguments about evolution, and gives us the opportunity to help students express their arguments clearly and concisely focusing on careful use of definitions and concepts. We want no blurring of concepts and issues.

ICONS OF EVOLUTION

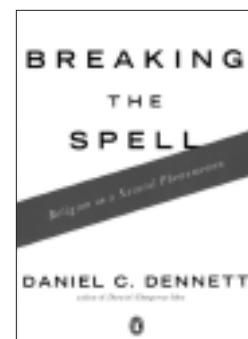
We show the video *Icons of Evolution* (based on the book of the same title by Jonathan Wells) to provide an opportunity to take a hard look at ID. This video takes the student to the core of the issues from the perspective of the ID enthusiast. The video is intelligently designed to *deceive* the viewer. Showing this video to church groups and school boards would likely convince the lay public that evolution is a "theory in crisis". In reality, the video is a mendacious attack on the integrity of scientists and scientific research. We follow the video with an extended discussion of issues raised by Wells and his ID colleagues.

We challenge several basic arguments central to the video's thesis and cast doubt on the veracity of the entire video. Several well-written articles available from the NCSE debunk *Icons of Evolution* and we use these to help make the case against the video. Two of these examples are familiar to RNCSE readers: the case of Roger DeHart, and the misuse and misinterpretation of data from evolutionary studies.

Roger DeHart, a teacher in the Burlington-Edison school district in Washington state, presented ID and other creationist misinformation about evolution to his high school biology class. *Icons of Evolution* portrays Dehart as a victim and martyr to generate sympathy and create the view that science and school boards unfairly undermine alternative (creationist) views. The fairness doctrine used by ID advocates plays a major role in this first part of the video.



BOOKREVIEWS



BREAKING THE SPELL: RELIGION AS A NATURAL PHENOMENON

by Daniel C Dennett
New York: Viking, 2006. 464 pages

Reviewed by John C Greene

In this sizeable book, Dennett, a philosopher already famous for his earlier work *Darwin's Dangerous Idea* (1995), undertakes to convince his readers that religious beliefs have no empirical foundation and hence should be abandoned to prevent religious fanatics from destroying the world in a nuclear holocaust. In developing his argument Dennett relies on two sources: Charles Darwin's theory of organic evolution by natural and sexual selection and Richard

Dawkins's theory of cultural evolution by the copying and competition of "memes" (ideas, rhymes, behavior patterns, and so on) which lodge themselves in the brain and compete for survival in human societies. Religious memes — gods, spirits, and so on — have

John C Greene earned his PhD in American history from Harvard in 1952. He taught at several Midwestern universities before settling down at the University of Connecticut from 1967 to 1987. His book The Death of Adam: Evolution and Its Impact On Western Thought (Ames [IA]: Iowa State University Press, 1959) was the first of several books on the rise and development of evolutionary thought, climaxed with Debating Darwin: Adventures of a Scholar (Claremont [CA]: Regina Books, 1999).

no reality except as memes because their extra-human existence cannot be proved scientifically by observation and experiment.

Armed with this criterion of believability, Dennett presents an imposing array of scientific studies of religion by philosophers of religion, sociologists and psychologists, anthropologists, and neuroscientists. His purpose, he confesses, is to "cajole" his readers into abandoning some of their religious convictions and thereby to alleviate the world's "moral crisis" and make possible scientific solutions to the world's momentous political decisions by "delv[ing] into the evolutionary history of the planet" (p 53).

It then turns out that the reasons we love the things we love — religion, romantic love, folk art and

However, the Burlington-Edison Committee for Science Education's website on this issue (<<http://www.scienceormyth.org>>) gives a different picture of what happened. DeHart, a die-hard creationist, taught creationism in his classes. The school board and superintendent initially worked out an agreement with DeHart, which he subsequently deliberately broke. Our students, at first sympathetic to DeHart, did not like his duplicity. For *Icons* to be effective, it is necessary to have sympathy for the fairness argument and for DeHart. We told our students that science has nothing to do with fairness; it is evidence that counts. That approach also helped undermine sympathy for DeHart.

Once sympathy for DeHart is challenged, the students are open to a more critical analysis of the deliberate deceptions, omissions,

and distortions of science that make up most of the "evidence" in *Icons*. For example, the video argues that if antibiotics are removed, bacteria revert to the wild type that lack resistance; therefore bacterial resistance has not "evolved". Whereas bacteria do revert under certain circumstances, *Icons* ignores evidence showing bacteria subjected to the selective pressure of antibiotics for longer periods of time retain the resistance even after the antibiotics are withdrawn. In essence, research on bacterial resistance to antibiotics supports evolutionary theory and does not contradict it.

APPLICATION TO THE CURRENT SITUATION IN THE USA

Scientists are at a disadvantage when ID rears its head in school board meetings and community

meetings. Our approach requires a significant amount of time and a willingness of the audience to listen and think about these issues. Addressing these issues in the classroom context is an ideal setting for grappling with the real arguments that ID proponents make. The value of exposing and examining ID arguments in detail was shown during the *Kitzmiller* trial in Pennsylvania when plaintiff's witnesses were given a chance to testify. The arguments took time, money, and careful examination by a judge who listened. This is a rare opportunity, but we are heartened that whenever anti-evolutionism has had its day in court, the courts have had no difficulty seeing through its pretences to scientific respectability.

In the classroom, however, we *can* take the time to explore, compare, and evaluate arguments, and

music, sugar and spice, and so on — are not the reasons we give when asked about them. The real reasons, Dennett argues, are evolutionary reasons, free-floating rationales that have been developed by natural selection, that “blind, mechanical, foresightless sifting-and-duplicating process that has produced the exquisite design of organisms” (p 79–80).

The second part of *Breaking the Spell* devotes four chapters to the “current version” of what scientific “proto-theories” tell us about how religions came to be what they are. It all began, says Dennett, with mutations in hominin genes enabling humans to speak. Language then spread rapidly, perhaps by sexual selection (women like to talk and hence would choose talkative males as partners). Language then gave rise to a virtual world of imagination, a world of intentional agents with beliefs and desires, a world gradually shaped by natural selection so as to improve cooperation within, but not among, social groups. Eventually — here Dennett cites Richard Dawkins — these “proto-memes” produced what neurosci-

entists call the “god center” in human brains, paving the way for shamans to take charge as “stewards” of the beliefs and practices of folk religions. As religions were “domesticated”, carefully crafted reasons for these beliefs and practices replaced earlier free-floating rationales.

As folk religions evolved into organized religion and priests took over as stewards of the sacred memes, Dennett continues, secrecy, deception, and the devising of doctrines designed to protect the body of beliefs from being discredited by scientific methods emerged, and rival systems of religious memes competed for adherents in the religious market place.

Moving forward in time, Dennett presents David Hume’s essay “Of Miracles” and William James’s *The Varieties of Religious Experience* as models of the empirical study of religion. Like Darwin’s cousin Francis Galton, Dennett proposes a scientific study of the efficacy of prayer. On this question and on the question whether religion is good for people Dennett finds the evidence “mixed”. On the related question

whether religion is the foundation of morality he concedes that “nothing approaching a settled consensus among researchers has been achieved” (p 280). At the same time he aligns himself with the “brights” — atheists, agnostics, freethinkers, secular humanists and others — who have “liberated” themselves from specifically religious allegiances and who “channel [their] charity and good deeds through secular organizations” because they do not want to be “complicit in giving a good name to religion” (p 300–1).

Dennett then mounts a spirited defense of “scientific materialism” — “the theory that aspires to explain all the phenomena without recourse to anything immaterial.” Spirituality, he insists, does not require believing in “anything supernatural”. Instead it is grounded in an “awestruck vision of the world” viewed with a “humble curiosity” and a sense of wonders and beauties still to be discovered by scientific inquiry (p 303). The presumed relation between religion and moral goodness, Dennett declares, is an illusion.

In a final chapter, “Now What



we are not constrained by time limits for testimony or sound-bite reporting. One advantage is that students begin to understand the difference between scientific arguments and *ad hominem* attacks. We also engage the emotional responses of people who feel that their belief systems or values are under attack by scientists, especially those who teach evolution. By addressing these issues head on in the classroom, we helped our students see that we were not afraid to confront the issues, but that we wanted to have a conversation that was rational and fair — and one that did not distort the scientific studies that support evolution.

We began teaching this class because we were frustrated with the assault on reason promulgated by creationists. We were concerned that teachers should not be forced to teach science through

the lens of creationism. Instead we decided to confront creationism, especially ID, directly and honestly with an understanding that both religion and science are part of human culture, but with the understanding that the two domains do not overlap. We found students are interested in learning about these issues. Not addressing them gives the argument to the creationists. We thought it was time to confront the issue. Most of our students have appreciated the opportunity to learn the facts about evolution and the conflict generated by “intelligent design” proponents and other creationists.

ACKNOWLEDGMENTS

Mark Terry, as well as Glenn Branch and Alan Gishlick from the NCSE, provided essential information and resources for our rebuttal to *Icons of Evolution*.

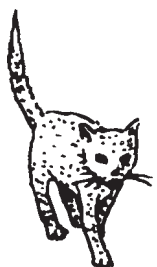
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Do We Do?”, Dennett describes his depiction of religion as “a family of ‘proto-theories’ in need of further development,” acknowledging that it “is not yet established and may prove to be wrong” (p 309–10). His only “categorical prescription” is: *do more research*. To ensure that the scientific researchers are well trained for their task, he suggests that priests, imams, and theologians prepare an “entrance exam” which researchers must pass before beginning their research. They can then tackle such questions as: Is religion the product of blind evolutionary instinct or rational choice? Confessing that he is “deeply moved” by religious ceremonies, music, and art, although unpersuaded by the doctrines which gave birth to them, he concludes with his “central policy recommendation”: “... that we gently, firmly educate the people of the world, so that they can make truly informed choices about their lives” (p 339).

Can we accept Dennett’s reliance on Dawkins’s much disputed theory of “memes” as cultural replicators and the supposed analogy between the copying of “memes” and the replication of biological traits? Dennett acknowledges the objections raised to this analogy by some of the scientists he cites as exemplifying the scientific study of religion and does all he can to answer them in Appendix A of his book. But this is not the only difficulty confronting Dennett. Religions such as Judaism and Christianity are historical religions claiming historical validation by the testimony of witnesses, as, for example, the resurrection of the crucified Jesus.

How would a scientist set out to prove that, in principle, miracles can never occur? The question whether they *have* occurred in any particular case must be settled by historical evidence, but Dennett shows very little interest in history or in historians like Thomas Cahill, Garry Wills, and John Pairman Brown who have taken the trouble to master the languages and perspectives of the ancient world. Like David Hume, one of his favorite philosophers, he excludes miracles as incompatible with the laws of nature (Hume’s criterion)

or with “scientific or philosophical materialism” (Dennett’s criterion). But there is nothing scientific about materialism as a philosophy, which the *Oxford American Dictionary* defines as “the opinion that nothing exists but matter and its movements and modifications.”

Among philosophers the mathematician-logician-philosopher Alfred North Whitehead took the lead in rejecting the concept of matter and expanding the idea of experience to embrace all natural entities, each entity prehending (taking into its own being the rest of the universe in some degree) in its occasions of experience. Among scientists the population geneticist Sewall Wright concluded that for humans “reality consists primarily of streams of consciousness. This fact must take precedence over the laws of nature of physical science in arriving at a unified philosophy of science, even though it must be largely ignored in science itself” (1977: 80). In science, he adds, the richness of the stream of consciousness is impoverished because the scientist restricts his investigation to “the so-called primary properties of matter” (p 80), which, ironically, can be measured only by voluntary actions. Wright concludes that we must acknowledge the necessity “of dealing with the universe as the world of mind” (p 85).

On the subject of the historical relations between science and religion in the Western world Dennett’s remarks are equally sketchy. He concedes that priests collaborated with astronomers and mathematicians in fixing the dates of religious festivals, but he seems unaware of the numerous books and articles on important developments in medieval science by scholars like Marshall Claggett, David Lindberg, and Carl Boyer, or of the religiosity of Johannes Kepler, Robert Boyle, and Isaac Newton, to say nothing of scientists such as John Dalton, Michael Faraday, Clerk Maxwell, and the early English geologists and paleontologists, or of the polls taken of the religious views of twentieth-century scientists.

Dennett seems equally ignorant of the views of writers like Whitehead, Michael Foster, Reijer

Hooykaas, and Denis Alexander who have argued cogently that the Christian world view helped to pave the way for the rise of modern science by conceiving nature as a contingent phenomenon intelligible only by empirical investigation, by raising the status of the manual trades essential to Bacon’s experimental method, and by glorifying natural philosophy and natural history as the study of God’s works (for example, Alexander 2001).

What, then, shall we conclude about Dennett’s wide-ranging effort to discredit religious beliefs in the hope of preventing a nuclear holocaust? Shall we permit his “memes” (that is, ideas) to infect our brains, or shall we use our brains to detect the weaknesses in his argument? No doubt his intentions are good. He believes in spirituality (“whatever that is”) but not in a human spirit (something science cannot conceptualize or explain). He concedes that science cannot give us moral values but thinks it can accumulate a “pool of knowledge” from which we can infer “what is just and what is good.” Apparently he is not aware of the words of the Hebrew prophet Micah: “What does the Lord require of you but to do justice, love kindness, and walk humbly with your God,” a prescription which TH Huxley, known as “Darwin’s bulldog”, considered “a wonderful inspiration of genius”. “But what extent of knowledge [Huxley adds], what acuteness of scientific criticism, can touch this? Will the progress of research show us the bounds of the universe and bid us say ‘Go to, now we comprehend the infinite?’” For his part Dennett relies on “respect for truth and the tools of truth-finding”.

“What is truth?” said jesting Pilate, and would not stay for an answer,” wrote Francis Bacon, an early advocate of experimental science. Bacon does not answer Pilate’s question, but in an essay “Of Goodness and Goodness of Nature” he links goodness to the character of the Deity and to the theological virtue of charity. He writes: “The desire of power in excess caused the angels to fall; the desire of knowledge in excess caused man to fall: but in charity there is no excess; neither can

angel nor man come in danger by it. ... But above all if he [the good man] have St Paul's perfection, ... it shows much of a divine nature, and a kind of conformity with Christ himself" (Bacon 1909). Apparently this early prophet of a new kind of science based on observation and experiment had none of the animus against religion which inspires the author of *Breaking the Spell*.

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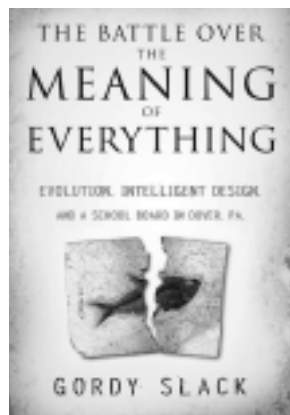
THE BATTLE OVER THE MEANING OF EVERYTHING

by Gordy Slack
San Francisco: Jossey-Bass, 2007.
240 pages

Reviewed by Randy Olson

In a time of despair over social and political decay in the US, Gordy Slack's *The Battle Over the Meaning of Everything* is a truly uplifting tale. It is the story of how community activists, concerned parents and passionately driven lawyers came together in Dover, Pennsylvania, to defend the constitution and keep religion out of science classrooms. It all happened less than two years ago, so this is history in the making. The American spirit is as alive and feisty as ever.

Randy Olson is a filmmaker and former marine biologist who wrote and directed Flock of Dodos: The Evolution-Intelligent Design Circus and co-founded the Shifting Baselines Ocean Media Project.



At stake in the Dover battle was whether "intelligent design" (ID) could be taught in public schools as an alternative to evolution. If you thought this was tedious, academic, or even trivial, think again. Slack helps us realize there was an element of "What if the South had won?" or "What if the Nazis had won?" to the conflict. To contemplate "What if the 'intelligent designers' had won?" is to glimpse the entire nation headed in an unsettling direction. The Dover trial had the potential to be as powerful in cultural dynamics and precedent setting as a reversal of *Roe v Wade*.

The book opens with Slack sitting down for a fateful lunch with Berkeley law professor Phillip Johnson, "the George Washington of 'intelligent design'", seven years before the trial. They square off on the two fundamental views of the world — theistic versus materialistic — which define the core of the ID-vs-evolution conflict. Johnson advocates a world of meaning and purpose, and casts evolution as its antithesis. Slack concedes personally "an inclination, a proclivity, a prejudice towards a world devoid of intention."

Slack details with a light yet concise touch the defining moments of the trial, pinpointing the two focal points of the case: the broad question of whether ID is science, and the specific question of whether the Dover school board violated the establishment clause of the First Amendment (separating church and state) when it insisted that a four-paragraph statement about ID be read in ninth-grade science classes.

By the end of the trial, the ID-supporting board members had been shown to be boldly dishonest (detailed in a chapter with the

wonderful title, "Liars for Christ"), their best scientist (Michael Behe) came off as contradictory and bumbling, and the ID movement at large was shown to be downright deceitful (the ID textbook *Of Pandas and People*, purchased by a board member for the school's library, was shown to be formerly a creationism textbook for which the term "creationism" had simply been searched and replaced with the term "intelligent design").

In the end, Slack reports what the world of evolutionary biology already knew: this conflict was not about science. It was about the politics and communication dynamics that swirl around science, and about the people willing to take on the scientific establishment in pursuit of a religious agenda. It was about the philosophical divide between camps who acknowledge different ways of understanding the world. With skillful simplicity, Slack draws the distinction between methodological materialism (MM) and philosophical materialism (PM). The former is an absolute necessity of science — to exclude the possibility of supernatural forces. The latter is merely an optional add-on, making it possible for scientists to also be religious.

Slack's book is a solid piece of work which provides both reporting and contextualization of the events at Dover. It is also written by a man with a very human heart, as is evident in the finest, albeit brief, passage of the book. Though clearly not the theist his father, a creationist, is, Slack concedes a moment of his own spiritual vulnerability when he admits having prayed as if he believed in God when his son lay in a hospital bed. That one brief nod to the powers that be makes clear that the author is not yet willing to totally commit himself to either end of the MM-PM spectrum. And that is what makes his writing so human and so worthy of reading.

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40 DAYS AND 40 NIGHTS: DARWIN, INTELLIGENT DESIGN, GOD, OXYCONTIN, AND OTHER ODDITIES ON TRIAL IN PENNSYLVANIA

by Matthew Chapman
New York: Collins, 2007. 272 pages

Reviewed by Lauri Lebo

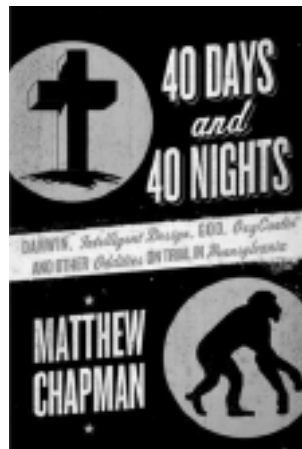
One of the most interesting aspects of the “intelligent design” battle that waged in the now famous community of Dover, Pennsylvania, was watching the national media at work. For when journalists descend on a small town, the local press tends to view the impending deluge of coverage cautiously and with trepidation.

In covering stories over the years that have drawn wide media attention, my fellow journalists and I have witnessed the routine. Prominent reporter flies into town, spends a few hours observing us as if we are rare and exotic zoo animals. Reporter jumps back on plane, tapping away on laptop a collection of anecdotes, using smug shorthand that all too often passes for insight. With sweeping generalizations, everyone in the town becomes the same. We locals have collected our favorites of such stereotypical assertions. The one I most enjoy is from a 2001 *Time* story about York, a town only a few miles from Dover. The writer referred to the city as “a hard-knock river town” — even though the closest river, the Susquehanna, is twelve miles away.

So when the national and international spotlight shone on Dover, those of us reporters who had been covering the story from the beginning were wary. In the end, we need not have been. For the most part, I found the national coverage to be thankfully free of such broad-brush stereotypes that plague this kind of parachute journalism.

Perhaps the best evidence of

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this is the trio of recently released books about the trial. Edward Humes, the author of *Monkey Girl* (New York: Ecco, 2007), and Gordy Slack, who penned *The Battle Over the Meaning of Everything* (San Francisco: Jossey-Bass, 2007), have written competent accounts. The third book, *40 Days and 40 Nights*, was written by Matthew Chapman, the great-great-grandson of Charles Darwin. The title is a reference to the trial's span of time, as well as ... well, you already know ... the number of days God had it rain on the world to cause the Noachian Flood.

Readers of *RNCSE* know well the details of the first, and likely only, constitutional challenge of “intelligent design”. The Dover Area School Board, in the fall of 2004, required that 9th-grade biology students hear a four-paragraph statement that said evolution “was just a theory” and that “intelligent design” is “an explanation of the origin of life that differs from Darwin’s view.” Students were also referred to the pro-“intelligent design” textbook, published by the Foundation for Thought and Ethics, *Of Pandas and People*. Eleven parents, who viewed the statement as an assault on the First Amendment’s prohibition of governmental advocacy of religion, sued the district.

The resulting six-week trial was a gripping interplay of fascinating scientific testimony, intelligent design exposed as fraud, and moving accounts by parents, teachers and yes, reporters, who described the divisiveness that the school board’s actions inflicted on the community.

Judge John E Jones III, in a thoughtful and precise 139-page opinion, not only chided the

“breathtaking inanity” of the school board members who lied under oath, but also ruled that “intelligent design” was a religiously based concept and was not science.

As I covered the trial, I had taken the view of an insider looking out and wondered how we are perceived. Chapman, as a native Briton, is the consummate outsider looking in, wondering who we are and what motivates us.

Kevin Padian, president of NCSE’s board of directors and one of the trial’s expert witnesses, wrote in his review in *Nature* (2007; 448: 253–4) of the Dover books, “Is the American tradition one of philosophical and political idealists, or of persecuted pilgrims who then turn around and ostracize anyone who doesn’t agree with them?”

It is a great question and Chapman explores it quite effectively. In a chapter recounting the trial testimony of Georgetown University theologian John Haught, Chapman writes of the joining of forces between conservative Protestants and Catholics. “Fundamentalists of all kinds have taken the idea of God and whittled it down into an ecumenical baseball bat which all can use to crack the heads of those they fear or hate. In the war against materialism, all allies are welcome” (p 117).

Perhaps the national media was so drawn to the story because what took place in Dover seems to serve as a reflection of what is playing out in Washington DC and across the country. Chapman frequently references this parallel. As he writes about Dover’s school board president Alan Bonsell, “He reminded me of President Bush in some ways. His faith seemed to have given him a confidence unwarranted by the facts” (p 25).

Chapman genuinely seems to want to understand the issues that played out in Dover and that led to the “intelligent design” showdown. At the beginning, he makes it clear that he develops a real affection for the characters that have made this story both so endearing and so compelling. He also seems to grasp, as evidenced in his account, that to take one person out of the story no doubt would have changed the story remarkably. In Chapman’s mind, everyone seems

to have played a significant part, even Matthew McElvenny, the trial's technology specialist, who delivered the graphics and exhibits each day onto a courtroom screen with nonplussed precision. Chapman calls McElvenny "the Wizard of Oz".

In his interviews, Chapman manages to uncover enticing tidbits of information. In his most delightful chapter, "Marilyn Monroe is alive and well," he writes about Angie Yingling, one of the school board members who, at first, supported the ID policy. The interview careens about like a roller coaster, and Chapman just holds on tight and enjoys the ride.

Chapman can also deliver an amusing turn of phrase and apt descriptions of the players. His summation of Nick Matzke, one of the plaintiffs' NCSE advisors, is dead-on and funny — although his description of plaintiffs' attorney Eric Rothschild, in comparing him to a defense attorney with nine children, as "the more sperm-conservative Jew" is a bit ... hmm, how to describe ... icky?

Still, Chapman's strength is that he grasps that perhaps the truth is more complicated and messy than the either/or proposition that Padian suggests — that the American tradition is neither solely one of persecuted and self-righteous pilgrims, nor one of tolerant idealists. For within every small town, there are both.

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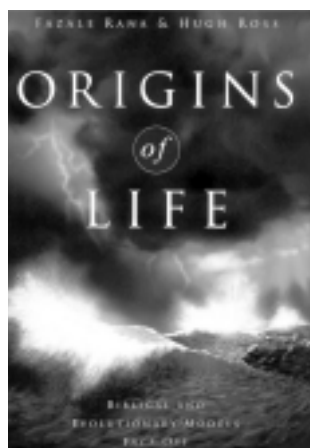
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ORIGINS OF LIFE: BIBLICAL AND EVOLUTIONARY MODELS FACE OFF

by Fazale Rana and Hugh Ross
Colorado Springs (CO): NavPress,
2004. 298 pages

Reviewed by Gary S Hurd

The standing of evolutionary biology is independent of the origin of life. This has been true from the publication of Darwin's *On the Origin of Species* in 1859. In that



work, Darwin allotted less than a page toward the end of 670 pages of text to the question. The last two sentences of the sixth edition read:

Thus, from the war of nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows. There is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one; and that, whilst this planet has gone circling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved.

And in an 1871 letter to the botanist Joseph Hooker, Darwin wrote:

It is often said that all the conditions for the first production of a living organism are present, which could ever have been present. But if (and oh! what a big if!) we could conceive in some warm little pond, with all

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sorts of ammonia and phosphoric salts, light, heat, electricity, &c., present, that a proteine [*sic*] compound was chemically formed ready to undergo still more complex changes, at the present day such matter would be instantly devoured or absorbed, which would not have been the case before living creatures were formed.

Darwin added, "It is mere rubbish thinking at present of the origin of life; one might as well think of the origin of matter."

However, faced with mounting evidence in support of evolutionary biology coming from scientific fields from genetics to paleontology, the origin of life has become an obsession with creationists who assert that science's failure to create life *de novo* is "proof" of supernatural creation. The first book-length argument of this sort was published in 1984. Written by Charles B Thaxton, Walter L Bradley and Roger L Olsen, *The Mystery of Life's Origin* argued that there is a scientific "crisis" in origin-of-life research, the Miller-Urey experiment was actually a failure, the early earth was oxidized and thus incapable of supporting amino acid synthesis, scientists are "dogmatic materialists" and manipulate their experiments to produce their desired results, and the second law of thermodynamics requires that order cannot appear spontaneously. There is even the introduction of a language model of DNA coupled to an "information entropy" argument.

Bradley and Thaxton reprised their information argument in 1994 for a book edited by Biola University philosophy professor JP Moreland entitled *The Creation Hypothesis*. Prominently displayed on the cover of the book are the names of Hugh Ross and the young William Dembski. In their chapter, "Information and the Origin of Life" (p 173-210), Bradley and Thaxton introduce the notion that "design detection" was similar to archaeology, the search for extraterrestrial intelligence (SETI) particularly as depicted in Carl Sagan's fiction, and forensic investigations. They also apply Leslie

Orgel's 1973 concept of "specified complexity" to life and rephrase it as a sort of measure of information. In short, Bradley and Thaxton's short chapter on the origin of life set the agenda for William Dembski's whole career. Similarly, *The Mystery of Life's Origin* is a cornerstone of Rana and Ross's book.

One of the goals of *Origins of Life: Biblical and Evolutionary Models Face Off*, according to the introduction, is to update *The Mystery of Life's Origin*. Fazale Rana has a chemistry PhD from Ohio State, and Hugh Ross has his PhD from the University of Toronto in astronomy. Together, they are leaders of Reasons to Believe (RTB), an old-earth creationist organization founded by Ross. Their strong arguments regarding the age of the earth are welcome antidotes to young-earth dogmas promoted by such outfits as Answers in Genesis. Rana and Ross are most certainly creationists, however, asserting that the biblical God actively intervenes in biology to "... create each and every new species of life on Earth"; in particular, "God supernaturally and miraculously created Adam from the 'dust of the earth' ..." (<http://www.reasons.org/about/8_myths_about_rtb.shtml>). (See Numbers 1993 and Scott 2005 for a discussion of the various flavors of American creationism.)

The errors begin immediately. There are errors of fact, logic, and scholarship. There is a standard dose of quote mining mixed in as well. The creationists' current favorite scientists to quote-mine on the origin of life are Robert Shapiro (a creationist's favorite since his 1986 book), Peter Ward (paydirt from the 2000 book *Rare Earth* co-written with Donald Brownlee), and Hubert Yockey (possibly the mother lode, with half a dozen citations). *Origins of Life* also offers ample cheap innuendo that scientists lack integrity, are "desperate," and "... are keeping quiet ..." about the so-called research failures Rana and Ross claim to expose. All this before the end of chapter 1.

More importantly, the "RTB Model" predictions offered by

Rana and Ross are not and cannot be differentiated from the predictions of modern origin-of-life research when they are testable at all. The creationist face of the subtitle's "face off" is a hollow mask. The proffered predictions from this "biblical model" appear on pages 43-4:

- 1 Life appeared early in Earth's history while the planet was still in its primordial state.
- 2 Life originated in and persisted through the hostile conditions of early Earth.
- 3 Life originated abruptly.
- 4 Earth's first life displays complexity.
- 5 Life is complex in its minimal form.
- 6 Life's chemistry displays hallmark characteristics of design.
- 7 First life was qualitatively different from life that came into existence on creation days three, five, and six.
- 8 A purpose can be postulated for life's early appearance on Earth.

Predictions 1-3 are identical with those of origin-of-life research. From geochemistry, it is known that the chemical signatures of life are present in the earth's oldest sedimentary rock (Rosing 1999, which is actually cited by Rana and Ross). A decade earlier than Rana and Ross, and well before Rosing's confirmation, Antonio Lazcano and Stanley Miller predicted that life appeared in as little as 10 million years following the establishment of favorable conditions (Lazcano and Miller 1994, 1996). Part of the second RTB prediction is trivial — life today began at some point and then persisted. The rest — the notion that the early earth was particularly hostile to life — is absurd. Modern life is found from alkaline to acidic conditions, from below freezing to near boiling temperatures, from harsh sunlight to total darkness, from alpine lakes and hyper-salty lagoons to the driest sands, in solid rock miles beneath the surface, and in forms dependent on molecular oxygen and in others destroyed by it.

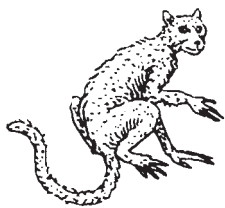
The term "specified complexity" was coined by Leslie Orgel in his 1973 book *The Origins of Life: Molecules and Natural Selection*. He wanted to draw the distinction between life and the non-living organization of crystals, which lack complexity, and non-living complex organic aggregates such as tars, which lack organization (that is, specificity). Given the importance that Rana and Ross give this notion of complexity in their model predictions 4 and 5, and their frequent call on "complex organization" and "function", I am unable to understand why they failed to explore its meaning. Equally puzzling is why they failed to mention that this was a central part of our scientific exploration of life for over 30 years. Predictions 4 and 5 can be dismissed.

Prediction 6, presenting the chemical "hallmark characteristics of design," would be an astounding breakthrough, and something that "intelligent design" creationists have all failed to provide in spite of a decade of promises. Alas, Rana and Ross also demur, apologizing that such a difficult topic is beyond the scope of their book, and promising a future book that will present "a comprehensive case for biochemical design" (page 43).

Their last two "predictions" are no such thing. They are at most scriptural interpretations or theological directives and leave no room for independent confirmation of any kind. Rana and Ross provide no means to differentiate their creationism from mainstream science, and try to usurp long-established scientific results for their "biblical model".

Lacking any valid predictions from the RTB model, there was little reason for me to persevere with the book, so I attribute my continued reading to masochism. The situation was not improved when I reached the "predictions" Rana and Ross claimed are the logical scientific consequences of origin-of-life research. These are listed below from pages 58-60:

- 1 Chemical pathways produced life's building blocks.
- 2 Chemical pathways yielded complex biomolecules.
- 3 The chemical pathways



that yielded life's building blocks and complex molecular constituents operated in early Earth's conditions.

4 Sufficiently placid chemical and physical conditions existed on early Earth for long periods of time.

5 Geochemical evidence for a prebiotic soup exists in Earth's earliest rocks.

6 Life appeared gradually on Earth over a long period of time.

7 The origin of life occurred only once on Earth.

8 Earth's first life was simple.

9 Life in its most minimal form is demonstrably simple.

The first "prediction" is amply demonstrated experimentally and by direct observations from geochemistry and astrochemistry. The second claim seems innocuous; after all, complex biochemicals are produced everyday by chemical pathways. However, Rana and Ross augment the second claim by explaining that it means that DNA, RNA, proteins, membranes, and cell walls "condensed" from the prebiotic environment. This does considerable violence to actual origin-of-life research and theory, which offer specific hypotheses about how such biomolecules formed and outlines cumulative sequences, rather than proposing life simply "condenses".

The third claim, that a rich chemistry existed under early earth conditions, is harmless enough until Rana and Ross piggyback the false assertions of their fourth prediction: The claims that modern origin-of-life researchers imagine a "placid" early environment for "long periods of time" and that such an environment would be favorable for the origin of life are unfounded. Nor are they necessary corollaries to the proposed third prediction.

The fifth proposed consequence for a natural origin of life, that some original remnant of the prebiotic environment must exist, is neither necessary nor cogent. However, such an evidentiary demand can be satisfied in two obvious ways. First, there are multiple examples of amino acids, sug-

ars, and even vesicle-forming lipids from products extracted from meteors, and detected in space by spectroscopy. These are the least altered fragments of our ancient solar system. As it turns out, Rana and Ross cite a small part of this literature, only to dismiss it. Second, isotopic studies provide some indications that even under the horribly destructive dynamics of the earth, some vestige could still exist (Pavlov and others 2001).

Their sixth proposed "scientific prediction" is simply untrue, as is their seventh. It is in fact an area of considerable research and discussion whether there were multiple origins of life, and whether this can ever be untangled. Work by Carl Woese (especially 1998, 2002) argues strongly that multiple origins will never be disentangled. It is with a respect bordering on awe that I contemplate how Charles Darwin allowed for this in the last page of his *Origin of Species*, writing that life was originally breathed "... into a few forms or into one."

Rana and Ross's claim that science predicts first life to be "simple" is incoherent because they have never defined complexity. The scientific conception of life has always entailed complexity, and Rana and Ross's argument cannot be evaluated without some anchor to make it meaningful. According to the scientific literature, the earliest life was simple compared with later life, and complex compared to most chemistry. Efforts are under way to find, as well as to theoretically predict, the minimal complexity of a living organism, and these results will also inform origin-of-life research.

One of the frustrations reviewing a book one finds fault with is suppressing the desire to mention all its errors, or worse attempting to correct them. Regarding Rana and Ross, this would require a longer work than their original. Failing that, a modest goal is to ask if they have met the goals they set forth in the introduction to their book. First, they wished to update the creationist classic *The Mystery of Life's Origin*. Second, they wished to set out their model of the origin of life. A striking departure from most creationist approaches is that Rana and

Ross promise explicit predictions for a "face off" with mainstream scientific theory.

So how did Rana and Ross fare in their efforts to update *The Mystery of Life's Origin*? They have failed. They have many references more recent than 1984, but no new ideas. Many references they do give are incorrect, incomplete, or misinterpreted. Every old objection raised by Thaxton, Bradley, and Olsen is recycled by Rana and Ross — from the idea that the second law of thermodynamics prohibits life to the claim that there is no explanation for chiral biomolecules, there is nothing new.

The origin-of-life model offered by Rana and Ross fails on two grounds. First, their biblical model slips in considerable scientific material without acknowledgment, and they then failed to present any evidence for those parts that are original. Second, they have offered a caricature of origin-of-life research in their so-called "naturalistic predictions." The greatest difference of course is that science never appeals to divine intervention to do the heavy lifting.

Do we know how life originated on earth? No. Is every one of the innumerable chemical and geological events that led to the origin of life preserved? No. Is this "proof" of a supernatural origin of life? No. Nevertheless, the origin of life will be the last refuge for "God of the gaps" arguments in decades to come.

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ENCYCLOPEDIA OF EVOLUTION

by Stanley A Rice
New York: Facts On File, 2007
(hardcover)
New York: Checkmark, 2007
(paperback)
468 pages

Reviewed by Tim M Berra

It is not often that one reads an encyclopedia from cover to cover, but this task was more enjoyable than onerous. I benefited from reading articles on EUGENICS, EVOLUTIONARY ETHICS, EVOLUTIONARY MEDICINE, THE EVOLUTION OF INTELLIGENCE, THE EVOLUTION OF LANGUAGE ABILITY and many other topics. There is much to commend this book, not the least of which is its dedication to Emma Darwin, Charles's devoted wife and caregiver. There are 215 entries, including biographical sketches of 47 scien-

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evolutionary science. Each topic begins with its definition followed by details. Many entries, such as FLORES ISLAND PEOPLE, GALÁPAGOS ISLANDS, and MACROEVOLUTION are treated in up to three pages, while LYSENKOISM, RED QUEEN HYPOTHESIS, and UNIFORMITARIANISM are covered on a single page. Major topics such as CHARLES DARWIN, CONTINENTAL DRIFT, and NATURAL SELECTION are given five or six pages, and the SCIENTIFIC METHOD merits seven pages and includes appropriate comments on the Bush Administration's abuse of science. There is a "Further Reading" section for each entry. Many articles are illustrated with helpful black and white drawings or photographs. There are cross-references in each entry. For example, the DONALD JOHANSON sketch leads the reader to AUSTRALOPITHECINES, HOMININ, BIPEDALISM, THOMAS HENRY HUXLEY, and HOMO HABILIS. Other subjects can be located via the index. There is no entry for memes, but the index directs the reader to the RICHARD DAWKINS account where memes are explained. The geological periods are treated in a uniform style that includes dates, climate, continents, marine life, terrestrial plants and animals, and extinctions.

The encyclopedia was written by a very well-read botanist who announces his Christianity in the introduction, but does not allow faith to overrule science. His position is elaborated in one of five boxed essays entitled "Can An Evolutionary Scientist Be Religious?" He says "yes," but he never details how to reconcile the two, nor discusses why he thinks it would be necessary. The other essays include "How Much Do Genes Control Human Behavior?", "What Are the 'Ghosts of Evolution'?", "Why Do Humans Die?", and "Are Humans Alone in the Universe?". The three-page

tists from LOUIS AGASSIZ to SEWALL WRIGHT that capture the essence of a person's contribution to

SCOPES TRIAL entry has a fascinating one-page box comparing the actual trial with the 1960 film, *Inherit the Wind*.

The Charles Darwin biographical sketch hits all the important highlights. The writing is at times thoughtful ("Charles Darwin was to put his inherited wealth to better use than perhaps anyone ever has") and occasionally simplistic ("He was attracted to Emma Wedgwood, who also happened to be his cousin, and she liked him as well, and they were married"). I have a few quibbles as with the statement that Fitzroy chose Darwin for the *Beagle* voyage because of the shape of his nose. Actually, Fitzroy the phrenologist nearly rejected Darwin, but Darwin convinced him that "my nose had spoken falsely" (Barlow 1958: 72). The suggestion is planted that the death of Annie, Darwin's eldest daughter, might have been due to inbreeding, but she actually succumbed to tuberculosis (consumption) (Keynes 2001: 219).

There is a presumable typo on p 32 where *Australopithecus afarensis* is substituted for *A africanus*, which could lead to confusion. No phylogenetic diagrams are given in the discussions of *Australopithecus* or *Homo* and some of the more recent books are not cited (Zimmer 2005). As an ichthyologist I am underwhelmed by the EVOLUTION OF FISHES article. It does not say much about the group of vertebrates that has more members than all other vertebrate classes combined. Rice stated that tetrapods evolved from crossopterygians rather than lungfishes as generally thought today, and he does not cite any major ichthyological texts. Some accounts read like the synthesis that comes from consulting a few sources, but that is to be expected in a single-author work of this scope for the general public. Rice puts an astonishing amount of important information at one's fingertips.

In the Alfred Russel Wallace section, Rice confused Borneo and Sulawesi (Celebes) and garbled the mammalian examples. Wallace's Line passes between Bali and Lombok and Borneo and Sulawesi (Berra 2001). To the west

of the line (Bali and Borneo) is the Oriental biogeographical realm and to the east (Lombok and Sulawesi) is the Australian realm. Sulawesi has at least one species of marsupial; Borneo has none (Flannery 1995). Five species of native felids occur on Borneo (but not tigers) while no native cats occur on Sulawesi (Sunquist and Sunquist 2002).

The appendix is a masterful 14-page, chapter-by-chapter summary of the sixth edition of *Origin of Species*.

There is relatively little overlap between accounts of the same subject in Milner's *Encyclopedia of Evolution* (1990) and the current volume. Reading both accounts of ROBERT CHAMBERS, for example, will provide more information and insight than reading only one. Many topics treated in one of the encyclopedias are not mentioned in the other, so even if Milner's book is in your library, you still need Rice's encyclopedia. Pagel's (2002) *Encyclopedia of Evolution* is a two-volume, multi-authored work of 1205 pages, which, naturally, can incorporate more details.

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. I wholeheartedly recommend this book, and at \$24.95, the paperback version is good value.

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AN INTRODUCTION TO BIOLOGICAL EVOLUTION

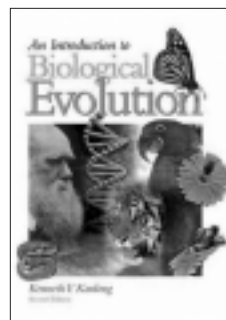
by Kenneth V Kardong
Boston: McGraw-Hill Higher Education, 2005. 322 pages

Reviewed by Werner G Heim

There are several excellent textbooks on the market for upper-level courses on evolution for biology majors in colleges and universities, but there are few recent books suitable for a class meant for general liberal arts students or for intelligent adult readers curious about the subject underlying all of modern biology. Kardong's *An Introduction to Biological Evolution* begins to fill the gap. It covers most aspects of the science of evolution, gives an excellent historical introduction, and sometimes points out the broader societal implications of particular aspects.

After a historical introduction, Kardong lays the groundwork with chapters on time and on heredity. The origin of life is covered only briefly, but the course of evolutionary change over time is well presented, perhaps somewhat incongruously in the same chapter with discussions of genetic coding, protein formation, and cellular metabolism. A strong chapter on the evidence for evolution is perhaps placed somewhat too early in the book, before most of the evolutionary mechanism has been discussed. The core material — selection, variation, and speciation — is handled well and in some detail. Perhaps the weakest part of the book is a chapter on life history

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because the reader might not see the relation of this subject to the evolution process.

The two chapters on human evolution present the material clearly while steering a middle course between the whirlpools of views among paleoanthropological experts. While the dispersal of *Homo sapiens* from Africa is well covered, there is no mention of the genetic tools by which some of these migration paths are studied. One learns little of such techniques as blood typing, haplotyping, mitochondrial DNA analysis, X- and Y-chromosome analysis, and so on, as tools for migration studies or intra-specific evolution.

A final chapter, "Evolutionary biology: Today and beyond", tells many interesting biological tales but does not always show their evolutionary components. A discussion of the evolutionary patterns seen in the HIV or flu viruses would have helped bring evolutionary biology into the reader's life. Three short appendices — on cell division, taxonomy, and molecular clocks — contain materials of a slightly more technical nature. A glossary helps with the specialized terminology.

There is, however, a glaring omission: The book says virtually nothing concerning the attacks made and being made on the concept of evolution and on the unhindered teaching of this science. Surely an educated citizen should know something of the groups in our society that are attempting to bring their supernaturally-based views into the biological sciences classroom. Equally important, the reader should learn to recognize the axioms and procedures of science so that he or she cannot be fooled by those who falsely claim that their views are equally good science as alternatives to evolutionary biology. The intended readers of this book are or will shortly be the votes who elect members of school boards, state legislators, and governors. If these voters cannot

distinguish good science from bad or from nonscience, it will not be surprising if their children will be taught something other than good biology.

The author deliberately chose to use colloquial language, sometimes resulting in the use of fifty words where forty might suffice, but making for easy reading. He does not shy away from technical terms when these are needed. The sequence of topics is suitable for class use without major rearrangement and the general continuity is good. While there are the usual misprints and minor problems, the material is, with perhaps a very few exceptions, accurate and properly presented. The black-and-white illustrations are mostly clear and helpful.

In summary, we have here a fine book suitable for the layperson, whether student or not, but one that could be substantially improved in an anticipated second edition.

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FRITZ MÜLLER: A NATURALIST IN BRAZIL

by David A West
Blacksburg (VA): Pocahontas
Press, 2003. 376 pages

Reviewed by Aubrey Manning

I have to confess that the subject of this biography was known to me only by name, as the originator of "Müllerian mimicry" — the concept that prey animals that signal their undesirability as food by warning coloration will tend to converge on the same colors and patterns. The more varied exam-

ples of the message "conspicuous black and orange or black and yellow means foul taste" there are around, the fewer chances of any individual's being the unlucky one from whom the predator learns this lesson! All distasteful prey will benefit and so natural selection will be in favor of the convergence that we see: black and orange butterflies, hornets, and tree frogs. It is an elegant concept widely borne out in nature, and one might deduce that its originator would have been a good naturalist. He was indeed; just how good is abundantly brought out in this fascinating book.

There has only ever been one account of his life, written by his cousin, which has never been translated and, although Müllerian mimicry is described in most elementary textbooks, I suspect that the ignorance confessed to above is widespread. Thus we are indebted to David West, an evolutionary biologist who has himself worked on mimicry in butterflies. He has translated the biography and skillfully interwoven it with extensive quotations from Müller's letters, many of which have never been published before.

Müller deserves to be celebrated because he was extremely important in the development of evolutionary ideas following the publication of the *Origin*. When he died in 1897, aged 75, in Brazil, where he had lived and worked since the age of 30, the obituary in *Nature* suggested that, "no other naturalist, save Darwin himself, has given the world so large and original a mass of observations of the kind by which natural selection has been supported." Müller's life as a naturalist is fascinating enough, but there is much more, because this biography gives an intriguing account of mid-19th-century German pioneers settling in the virgin forest areas of Brazil around the mouth of the Itajai river, about 400 miles south of Rio de Janeiro.

Müller was born in 1822. His father was a fairly impecunious pastor, although relatives in pharmaceuticals were prosperous enough. Fritz might have gone into the business but shifted into medical school at the age of 19. He had

already begun to rebel against the conservative religious framework of society in Germany at this time; indeed liberal religious groups were in a state of near revolution. Müller was caught up in this ferment — he refused to take his degree because it would have required him to swear an oath involving God — and though he taught for a short time, he felt, like many others, that he must leave the country. This he did comprehensively, never returning to Europe.

He went with his wife, of whom we regrettably know next to nothing, to become a pioneer in Brazil: clearing land, planting crops, building a house. From childhood fascinated by the natural world, he wrote a few letters fretting at his lack of time for scientific exploration of the new world around him, but he obviously enjoyed the challenge of labor, toiling barefoot, building, and growing food. Müller was one of a group of Germans who founded small settlements in southern Brazil and gradually built up a community. It was not easy. The displaced indigenous people were not friendly, nor were the jaguars. There were occasional huge floods. But here Müller began the ceaseless observations and writing about the fauna and flora all around in which he delighted.

His community, Blumenau, was set up within the Santa Catarina province, and it is good to read that sometimes the provincial governors were enlightened people. Müller's scientific background was recognized and valued, and he was asked to teach at the main town on the coast. He did not find it easy to settle back into urban life after pioneering — in particular he missed going barefoot — but he delighted in the opportunity to study the marine fauna, the Crustacea being a special interest. Soon he was able to go back to Blumenau but with a salary from the provincial museum to be a "travelling naturalist", more or less a perfect situation for him. He made many extensive journeys around the Itajai basin.

West weaves all this story together very skillfully with examples of Müller's own writing. Müller was in many ways an extremely modest person,



although I suspect he was sometimes stubborn and not always tactful in dealing with others. It is noteworthy that he was capable of seeing well beyond racial prejudice. He wrote in 1860 of his pupils, "... the best by far is a black man of pure African lineage. He has an easy grasp of things and a zeal for learning That black man is fresh evidence for my opinion, contrary to the prevailing view that the Negroes are an altogether inferior race ..." We may note that Müller was not so generous to some of his fellow Caucasians. In 1871, he wrote to his brother back in Germany deploring the fact that obstacles are put in the way of increased immigration, which could allow Germans to predominate in southern Brazil and "... eventually displace the degenerate Latin element." Here, one feels, the heart remains firmly German and we are dealing with cultural rather than racial prejudices!

Müller lived on actively almost to the end, keeping up his ceaseless observation and recording. His was an interesting life in early South American natural history, then, but why is Müller so important in the history of evolutionary science? How did he win that comment from *Nature's* obituarist? The point is that although he was geographically isolated for all his career, Müller published a great deal in European and Brazilian journals, and he was in active correspondence with most of the great biologists of the day, most notably with Darwin. He immediately accepted evolution through natural selection and realized that his studies of the Crustacea added powerful evidence for Darwin. Müller knew that the diverse adult forms of crustaceans revealed their common ancestry by their development from common larval forms and he worked out their life histories.

Only five years after the *Origin of Species* appeared, Müller collected together a range of diverse studies bearing on evolution and published them with the direct aim of supporting the new ideas, calling his book simply *Für Darwin (For Darwin)*. Dozens of letters went back and forth between Müller and Darwin.

Indeed towards the end of Darwin's life, Müller was one of the few people in the field with whom Darwin kept in touch, constantly asking him for information. In one of his last letters, Darwin writes, "You have such wonderful powers of observation that your opinion would be more valued by me than that of any other man."

West's biography is both a compelling read and a real work of scholarship with abundant references that will enable anyone to go further in the exploration of this remarkable naturalist's life and work. He deserves celebrating as a scientific as well as a Brazilian pioneer. I was disappointed to find that in their classic biography of Darwin, Adrian Desmond and James Moore dismiss Müller's contribution in a few throwaway lines. I feel that Darwin himself would have done better.

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[Fritz Müller: A Naturalist in Brazil is available from the publisher. Visit <<http://pocahontaspress.com/sections/scientific/brazilNaturalist.htm>> or call 1-800-446-0467 for details.]

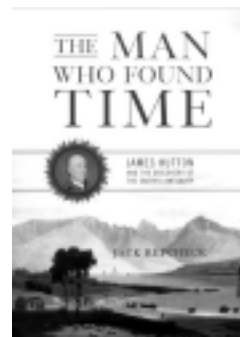
THE MAN WHO FOUND TIME: JAMES HUTTON AND THE DISCOVERY OF THE EARTH'S ANTIQUITY

by Jack Repcheck
New York: Perseus Publishing,
2003. 256 pages

Reviewed by William Parkinson

Jack Repcheck's book is a well-written account of the career and times of James Hutton. Hutton, a well-known figure in geological circles, is the man credited with discovering so-called Deep Time. Unfortunately, Hutton's contributions to science, unlike those of

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Charles Lyell, remain unrecognized by the general public. Repcheck's stated task is to give Hutton his due by enlightening the general public about Hutton's seminal contribution to our understanding of earth history.

As Repcheck paints his portrait of Hutton, he takes us through the period of the Scottish Enlightenment and the history of Scotland at that time. Repcheck does a decent job at situating Hutton in his proper cultural and historical context. Hutton, as Repcheck notes, was part of the Scottish Enlightenment, one of the most astonishing periods of original thought and intellectual contribution in recorded history (earning Edinburgh the moniker of "the Athens of the North"). Other figures of this remarkable era in Scotland are the economist Adam Smith, the sociologist Adam Ferguson, the philosopher and historian David Hume, the poet Robert Burns, the novelist Sir Walter Scott, and the great chemist Joseph Black.

Beyond the general background material of Hutton's life, Repcheck also introduces the reader to Hutton's scientific contributions. First, Repcheck escorts his readers deftly through the phase of Hutton's life when he discovered the rock cycle. Hutton was the first to recognize the importance of erosion in the rock cycle, and the place of eroded sediments in producing sedimentary rocks. Hutton was also the first to recognize igneous intrusion in rocks (such as sills and dykes). At the time, many of his conclusions were quite controversial.

More importantly, though, Repcheck gives a good account of Hutton's discovery of an important geological outcrop and its implications: Siccar Point, Berwickshire, in southern Scotland. This outcrop may



be called the “other Rock of Ages”, for it was here that Hutton was able to convince his skeptics of the antiquity of the earth. This outcrop is composed of Silurian greywacke (known as “schistus” to Hutton) of marine origin (established by the fossils contained in the greywacke), tilted into a vertical orientation. It forms an angular unconformity (that is, two stratified rock units, with the lower one being tilted and eroded while the upper unit, deposited on the lower unit, is at a lower angle than the bottom unit) with the overlying Old Red Sandstone, also of marine origin (again established by fossils), in a normal horizontal position above it.

Hutton, using common sense and a few established principles, was able to figure out the general sequence that produced this particular rock outcrop. The Silurian greywacke had been deposited horizontally in a marine environment, which, Hutton reckoned, took thousands of years to accomplish. Thousands of years more was needed to accumulate enough sediment over this strata to cause the kind of pressure and heat necessary to lithify the greywacke. Later, heat and other additional forces caused the originally horizontal strata to be contorted and lifted up into a vertical plane. The once-submerged rock was then uplifted out of the water and erosion began immediately to wear at the greywacke. Once again the greywacke was submerged under the water (either through subsidence of the land or through a transgression from the sea) and the Old Red Sandstone, which contains a different assortment of fossilized marine life, as well as sediments derived from a different rock source, was laid down on top of the Silurian greywacke. The Old Red Sandstone and the Silurian greywacke that we see today were both covered with sufficient sediment to produce the necessary heat and pressure to lithify the Old Red Sandstone. Finally, both the Silurian greywacke and the Old Red Sandstone (which is today recognized as Devonian in age) were lifted up and exposed to the processes of erosion (for a photograph of the Siccar Point outcrop, see Doyle and others [2001: 20]).

As he worked out the sequence of events for Siccar Point, Hutton realized that this one outcrop could not have formed in the single year of the Flood, or even in the 6000 years generally believed to have transpired since the beginning of Creation. It was an astonishing conclusion! Hutton would later take those who doubted his claims to Siccar Point and use it as an incontrovertible testimony to the antiquity of the earth. It was at Siccar Point that biblical chronology fell to the observations of science, and for that reason alone, it deserves to be better known among the general public.

As for the influence of Hutton's observations, they were enormous, as Repcheck observes. In the end it was Charles Lyell who recognized the significance of Hutton's work, reserving a place of honor for Hutton in his historic textbook *Principles of Geology*. Lyell was taken to Siccar Point after Hutton's death by Hutton's friend James Hall — and Siccar Point worked its magic once again. Lyell became a believer of Hutton's claims. Later, a young Charles Darwin read Lyell, on his trip to the Galápagos Islands, and recognized the significance of Hutton's and Lyell's work for his own developing theory of evolution. Simply put, without Hutton's contribution, we would never have had the theory of evolution from Darwin.

It is when discussing the reception of Hutton's work, in chapters 8–10, that the book really shines. Repcheck chronicles in detail the reception of Hutton's presentation to the Royal Society of Edinburgh in March 1785 and his battle to win over his skeptics; he then progresses to the time when Darwin read Lyell's discussion of Hutton and accepted the conclusions of both men. The three chapters are really the heart of the book and make for engaging reading.

Repcheck documents the resistance to Hutton's ideas both from those still committed to biblical literalism and from the Neptunists, proponents of Abraham Gottlob Werner's idea that the rocks found in the present era were revealed when a “universal ocean” that formerly covered the whole world receded.

I must level one criticism, however. Although Repcheck discusses some of the scientific opposition to Hutton's ideas, he fails to consider the position of the Church of England or the Church of Scotland concerning Hutton. This leaves several questions unaddressed such as: Did the Church of Scotland weigh in on the controversy surrounding Hutton? What about other denominations? What about the so-called chattering classes? Did they accept Hutton's ideas, condemn them, or just ignore them? From the perspective of those interested in church/science issues, this is an unfortunate gap in Repcheck's research. Understanding the interactions with the religious authorities is vital to Hutton's story, and regrettably Repcheck has not included this dimension.

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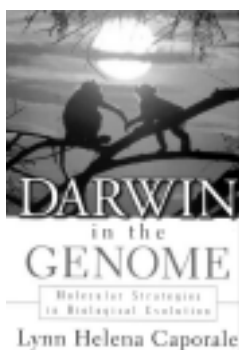
DARWIN IN THE GENOME: MOLECULAR STRATEGIES IN BIOLOGICAL EVOLUTION

by Lynn Helena Caporale
New York: McGraw-Hill, 2003.
245 pages

Reviewed by Finn Pond

What if mutations are not random? A mechanism that curtails mutation in critical housekeeping genes while allowing exploratory mutations in certain contingency genes would be a boon to a population of organisms. In a highly variable or changing environment, directed mutations could provide an ideal survival strategy; a species could in a sense regulate its own evolution, not leaving its fate entirely to chance. Is this possible?

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Molecular biologist Lynn Helena Caporale, in her book *Darwin in the Genome: Molecular Strategies*

in *Biological Evolution*, argues that the mechanisms by which genetic variation occur are themselves subject to natural selection. The result, she contends, is that genomes have evolved mechanisms that enhance the possibilities for beneficial mutations and genomic changes, while limiting changes that are likely to be detrimental. In other words, organisms have evolved mechanisms to harness genetic change to their advantage.

Nearly one hundred and fifty years ago, Charles Darwin laid the foundation for a scientific understanding of biological evolution. Darwin built a strong case for the common ancestry of living organisms and gave biologists a mechanism to explain the vast diversity of life; the process of natural selection is his legacy.

Evolutionary theory has not remained static, however. In the first half of the twentieth century, new insights about mutation and the genetics of variation revitalized Darwinism, leading to the development of powerful mathematical approaches to study evolution. Neo-Darwinism, as the synthesis of genetics and natural selection came to be labeled, possessed great explanatory power and continues to dominate much of evolutionary thought. In this view, heritable variations, the raw material for evolution, result from random mutations in a population. Biotic and physical constraints, acting through natural selection, then shape the evolution of a population in a non-random way.

During the past twenty or more years, we have seen an explosion of molecular and biochemical investigations into the nature of genetic systems. Our understanding of how information is stored, maintained, retrieved, and transmitted has changed considerably as a

result of genome exploration. Biologists are now more hesitant to talk about “junk DNA”, for there are clear examples of non-protein-coding, repetitive DNA sequences that modulate gene expression. We now recognize a variety of small RNA molecules that affect genomic interpretation. We have documented genomic reorganizations by retroviruses and transposons. We now know that the structure of DNA is not uniform throughout a genome, and we have learned that the rate, type, extent, and location of DNA mutations can vary within a given genome.

These new understandings have led some biologists to suggest that the traditional gradualism of neo-Darwinism may not be the only pattern of biological evolution, and that speciation might in some instances have occurred quickly and dramatically through processes such as endosymbiosis, horizontal gene flow, or genomic reorganization by retroviruses.

Caporale presents examples of both non-random and large-scale genomic changes. She describes, for example, how mutational hot spots in genes for vertebrate antibodies can enhance the capabilities of our immune system and how similar hot spots in cone snail toxin genes expand their arsenal of toxic weaponry. Caporale argues that some DNA sequences are more prone to mutational events because of their chemical nature and the biochemistry of DNA replication machinery. She points out that blocks of genetic information can be shuffled within a genome and even passed to the genome of another species. The strength of her book is in collecting and detailing relevant examples from the literature. She maintains throughout that not all mutations are random and that “focused, regulated variation is biochemically possible.”

Caporale’s idea of “variation-targeting mechanisms” has been criticized for implying foresight in the selection process. She argues, however, that naturalistic mechanisms can explain what appears to be directed purposeful mutation. Caporale offers an approach to working out the molecular and biochemical details, and challenges

us to consider the idea that the mechanisms for generating genetic diversity can themselves evolve.

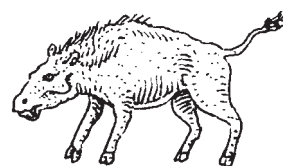
Of course, creationists will attempt to portray such theorizing by biologists as a crisis in neo-Darwinian thought. They will be wrong, as usual. “Survival of the fittest” via natural selection remains the cornerstone of evolutionary theory. Now under discussion are the mechanisms for generating genetic variation; that is, the “arrival of the fittest”, with molecular biology demonstrating that genetic change is not limited to an accumulation of random point mutations.

Although written for a lay audience, Caporale’s prose is clumsy and cloudy at times, and unfortunately small errors crept into the text, as, for example, when she gives the size of the human genome as three billion base pairs distributed in forty-six chromosomes instead of the haploid number of twenty-three (twenty-four if we make allowance for two different sex chromosomes).

She uses informal language, attributing “anticipation” or “strategy” to genomes. Although it should be clear to biologists that these are rhetorical devices, this distinction may be lost to others, and could provide fertile ground for that creationist specialty, quotation out of context. To talk of genomes as having “worldviews”, or to say that “information can flow back from survival to the places in the genome that affect the generation of diversity,” will leave some readers uncomfortable.

Despite these weaknesses, I recommend this book to anyone interested in learning more about the molecular complexities of genomes and current discussions on genetic variation.

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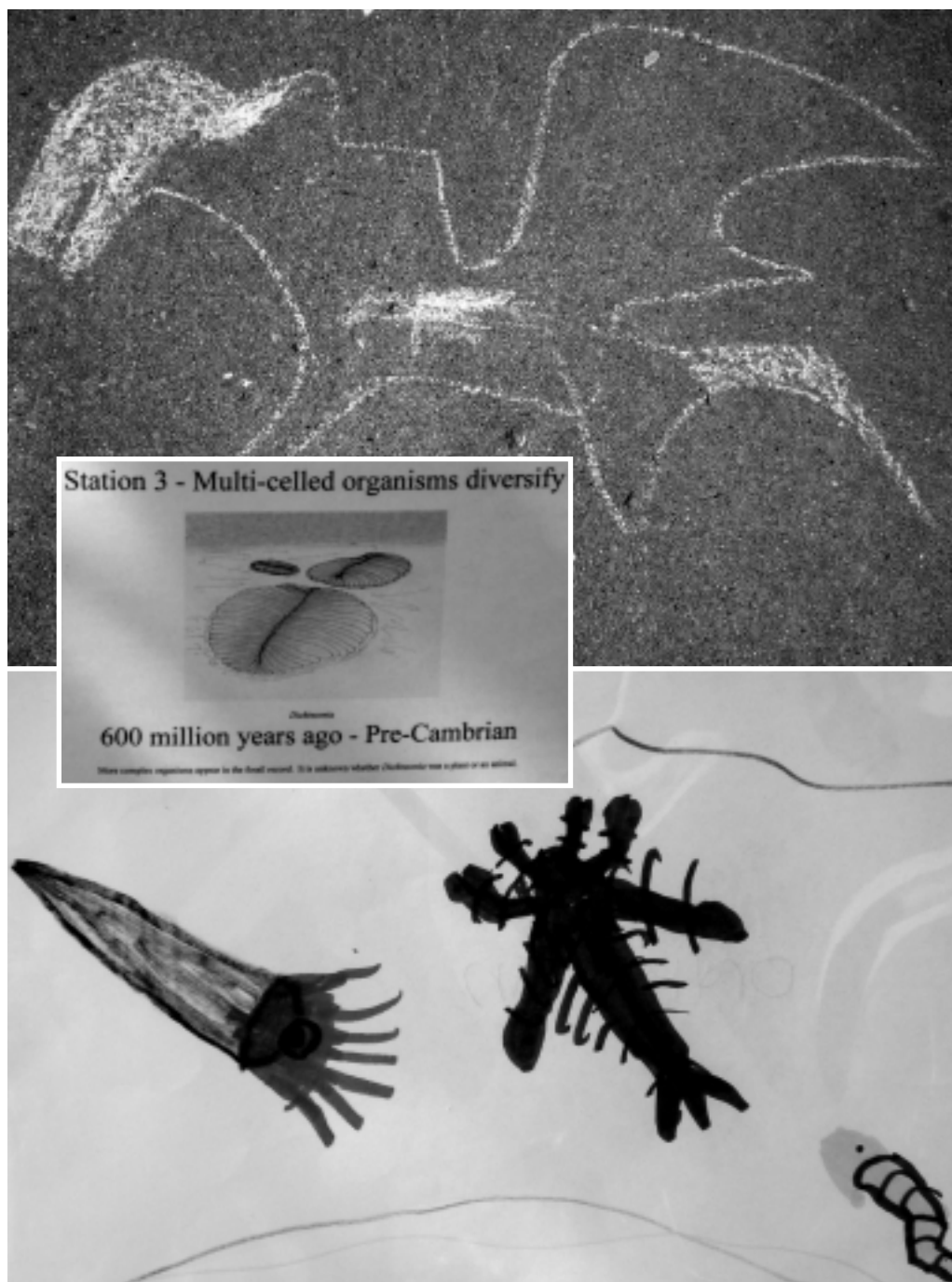
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DEFENDING THE TEACHING OF EVOLUTION IN THE PUBLIC SCHOOLS



Volume 27, Numbers 5-6

SEP-DEC, 2007

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600 million years ago - Pre-Cambrian

These complex organisms appear in the fossil record. It is unknown whether Dickinsonia was a plant or an animal.

Evolution and
Creation in
National Polls

Creationism in
Russia

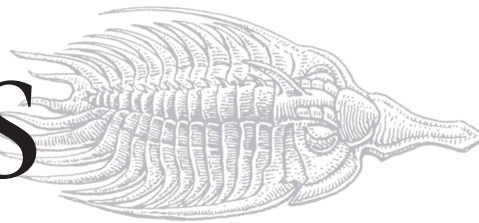
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Cover: Images from Nick Schweitzer's evolution installation
Photography by Andrew J Petto

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For more information on Ray's work explore his website at <www.trollart.com>.

A key argument we often hear as a justification for introducing anti-evolutionary materials into schools or anti-evolution legislation is the strong public support for "alternative" models. One of the persistent sources of support for that position comes from public opinion polls.

Perhaps the best-known poll is from the Gallup Organization, which began polling on creationism/evolution in the early 1980s; this poll has shown almost no significant change in public commitment to evolutionary or creationist positions for almost three decades. However, commentators have regularly remarked on the peculiar way in which Gallup's questions are phrased and wondered to what extent that phrasing might have affected the results.

In this issue, George Bishop examines the creationism/evolution polls themselves. He compares several polls that use slightly different ways of framing the issues. His conclusion is that exactly how these questions are phrased does matter. Rather than tapping some deep, strongly held convictions, the questions seem to evoke different positions on creationism/evolution issues depending on what they ask and how they ask it. So, is support for evolution stronger — or weaker — than polls suggest? Find out inside.

Our centerfold front page also focuses on media issues. Communications professional Martha Heil reminds us that a large proportion of the US public receives its news via television media. Since these reports seldom exceed 60 seconds, it is important for supporters of evolution and good science education to be prepared to provide a short, effective account of their positions and concerns. It takes practice, but everyone who has occasion to speak to television reporters should keep these handy tips in a prominent place for easy access when the media call.

IN THE NEWS

Since our last issue, the NOVA program *Judgment Day* was released and broadcast in most markets served by Public Broadcasting stations. There were a few exceptions, as NCSE deputy director Glenn Branch tells us. Despite the predictable flurry of criticism from creationists, the response was strongly favorable, and the program was highly effective in presenting the events of the controversy in Dover, Pennsylvania, and the resulting trial.

There are two notes from



Oklahoma. Daniel Dickson-LaPrade reports on a presentation by William Dembski at the University of Oklahoma. This was not a performance "for the books", and we read that the reception to the presentation was not favorable. Phillip E Klebba permitted us to

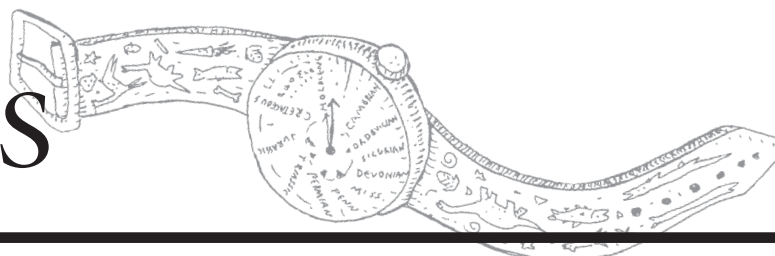
reprint a modified version of his letter to the student newspaper in response to Dembski's presentation. Klebba reminds us that "irreducible complexity" is little more than a catchphrase for "what we cannot explain — yet!" He gives us several historical examples of problems in biology that might have been considered "irreducibly complex" at one time — all of which are now understood entirely in terms of the natural processes that produce them, thanks to the persistent application of scientific method.

We also report on anti-creationist activities across the country and in Europe, where the Council of Europe's Parliamentary Assembly passed a version of its "The dangers of creationism in education" resolution. Back in the United States, NCSE and its allies succeeded in repelling Louisiana Senator Vitter's attempt to insert earmark funding in a spending bill that would support creationist educational "research" in Louisiana.

Two important stories that were breaking while this issue of RNCSE was in press. Chris Comer — the head of science curriculum at the Texas Education Agency for nine years — was forced to resign in November 2007 after forwarding an announcement of a talk by Barbara Forrest, a member of the NCSE board of directors who served as an expert witness for the plaintiffs in the *Kitzmiller* trial. And in Florida, where the "e-word" used not to appear in the science education standards, a new set of standards was adopted in March 2008, with the "e-word" front and center. We'll have more on those stories in the very next issue of RNCSE.

ERRATUM

In Charles F Austerberry's review of *Evolution and Christian Faith* (RNCSE 2007 Jan-Apr; 27 [1-2]; 49-50), a sentence on p 49 about Kenneth R Miller, Francis Collins, Francisco J Ayala, and Joan Roughgarden was inadvertently altered in the editorial process in a way that changed its meaning: it should have read, "All four are theistic evolutionists who reject 'intelligent design' as well as special creationism" (rather than "as special creationism").



Judgment Day: Intelligent Design on Trial

Glenn Branch
NCSE Deputy Director

Judgment Day: *Intelligent Design on Trial*, a special two-hour documentary about the *Kitzmiller v Dover* case, in which teaching “intelligent design” in the public schools was ruled to be unconstitutional, aired nationwide on PBS at 8:00 PM on November 13, 2007. “*Judgment Day* captures on film a landmark court case with a powerful scientific message at its core,” explained Paula Apsell, NOVA’s Senior Executive Producer, in a publicity statement. “Evolution is one of the most essential yet, for many people, least understood of all scientific theories, the foundation of biological science. We felt it was important for NOVA to do this program to heighten the public understanding of what constitutes science and what does not, and therefore, what is acceptable for inclusion in the science curriculum in our public schools.”

Reviewing *Judgment Day* for the November 8, 2007, issue of *Nature* (450: 170), Adam Rutherford was impressed, not least with the way in which the filmmakers met the challenge of retelling the story. “The makers of *Judgment Day* inject tension with eyewitness accounts from the people of Dover,” he wrote, “and home-video footage of raucous school board meetings shows how passionate and divided this small community became. It works: it is inspiring to hear parents and educators, such as Sunday school and physics teacher Bryan Rehm, recount how they refused to be steam-rolled into bringing religion into the science classroom.”

“*Judgment Day* gracefully avoids ridiculing intelligent design for the pseudo-intellectual fundamentalist fig-leaf that it is, by simply showing how the protagonists shot themselves in the foot,” Rutherford added. Acknowledging that the “intelligent design” movement is still alive in the wake of the trial, he nevertheless concluded, “the *Kitzmiller v Dover* verdict, matched this September with the outlawing of intelligent design in the UK national curriculum, marked the official neutering of this unpleasant, sneaky movement in much of the western world. *Judgment Day* is just the sort of thoughtful programming that celebrates how sensible people — faithful and otherwise — can use science and reason to combat fundamentalism.”

Judge John E Jones III, the federal judge who presided over *Kitzmiller v Dover*, appeared on The NewsHour on November 13, 2007, to discuss the show. Following a clip from the program, Jones discussed his background knowledge of “intelligent design” and evolution, the Establishment Clause and its applicability in the *Kitzmiller* case, the role of the independent judiciary, and the influence of his seminal decision. Jones commented, “It’s not precedential outside of the middle district of Pennsylvania, but I thought that if other school boards and other boards of education could read it, they would possibly be more enlightened about what the dispute was all about.”

On the same day, NCSE issued a press release (see sidebar, p 5) congratulating the producers of *Judgment Day* for the show’s accuracy. “NCSE has been studying the influence of creationism and its assault on science education for the past twenty years,” said Eugenie C Scott, NCSE’s executive director. “*Judgment Day* accurate-

ly portrays the events that led to the legal decision that it is unconstitutional to teach ‘intelligent design’ in public school science classrooms.” The press release also highlighted NCSE’s role in the trial, observing that three members of its board of directors testified as expert witnesses for the plaintiffs, and that NCSE’s archives provided critical evidence for the linkages between “intelligent design” and previous forms of creationism. (For more on NCSE’s role in the trial, see *RNCSE* 2006 Jan-Apr; 26 [1-2].)

For its part, the Discovery Institute attempted to poison the well by offering a series of shrill press releases, not all of which seem to have been carefully considered. One, dated November 9, 2007, took exception to *Judgment Day*’s use of actors to re-enact the testimony during the trial by saying, “First they dramatized the OJ Simpson trial. Then they acted out Michael Jackson’s courtroom drama. This time around we have NOVA re-enacting parts of the 2005 Dover intelligent design trial presided over by Judge John E Jones” — thus comparing the proponents of “intelligent design” to alleged murderers and pedophiles, which was presumably not the intention. In any case, the effort was largely wasted: the press releases were virtually ignored not only by the mainstream media, as with the Discovery Institute’s similar press release campaign against *Evolution* in 2001 (see *RNCSE* 2001 Sep-Dec; 21 [5-6]: 5-14), but also by the publications and organizations on the political and religious right that are usually receptive to the “intelligent design” movement’s message.

Meanwhile, *Judgment Day* continued to receive high praise from reviewers, both in Pennsylvania, where the historic trial took place, and across the



Judgment Day Accurate, NCSE Reports

November 13, 2007 — The National Center for Science Education congratulates the producers of *Judgment Day*, a documentary about the seminal *Kitzmiller v Dover* trial of 2005, for its accurate portrayal of the case that showed intelligent design to be a specific religious viewpoint. *Judgment Day* premiers on November 13, 2007, on PBS stations nationwide.

“NCSE has been studying the influence of creationism and its assault on science education for the past twenty years,” said Eugenie C. Scott, NCSE’s executive director. “*Judgment Day* accurately portrays the events that led to the legal decision that it is unconstitutional to teach intelligent design in public school science classrooms.”

NCSE served as a consultant for the plaintiffs’ successful legal team in the case, and three members of its board of directors — Kevin Padian, Professor of Integrative Biology at the University of California, Berkeley; Barbara Forrest, Professor of Philosophy at Southeastern Louisiana University; and Brian Alters, Professor of Education at McGill University — testified as expert witnesses at the trial.

Research in the NCSE archives played a crucial role in demonstrating the links between “intelligent design” and previous forms of creationism. “They tried to make an end-run around an earlier generation of legal rulings by switching the word ‘creation’ to ‘intelligent design’ in drafts of a creationist textbook,” commented Nick Matzke, NCSE’s scientific consultant for the Dover plaintiffs and now a doctoral student in integrative biology at the University of California, Berkeley. “We found documents in the NCSE archives which were ‘missing links’ in this evolution of creationism.”

“‘Intelligent design’ has been judged by both the scientific community and a court of law to be a form of creationism,” explained Richard Katskee, assistant legal director of Americans United for Separation of Church and State and co-counsel for the plaintiffs. “It

isn’t science and it doesn’t belong in the science classroom.”

On December 20, 2005, Judge John E. Jones III ruled that “intelligent design” is “a religious argument. In that vein, the writings of leading ID proponents reveal that the designer postulated by their argument is the God of Christianity ... The overwhelming evidence at trial established that ID is a religious view, a mere re-labeling of creationism, and not a scientific theory. ... It is therefore readily apparent to the Court that ID fails to meet the essential ground rules that limit science to testable, natural explanations. Science cannot be defined differently for Dover students than it is defined in the scientific community.”

NCSE board member Barbara Forrest’s expert testimony about the history of the “intelligent design” movement played a key role in the ruling. “The ‘intelligent design’ movement is a direct descendant of ‘creation science’ and employs virtually all of the arguments and terminology used by earlier creationists. Most important, like earlier forms of creationism, ID is driven by the same religious motives and goals,” Forrest commented. “The NCSE archives provided primary sources critical to showing how ID’s arguments, ideas, and people simply moved from ‘creation science’ to ‘intelligent design.’” The National Center for Science Education maintains an archive of transcripts, expert reports, legal filings, and other documents related to the *Kitzmiller* trial on a website at http://www2.ncseweb.org/wp/?page_id=5.

The National Center for Science Education is a nonprofit organization dedicated to defending the teaching of evolution in the public schools. The NCSE maintains its archive of source material on the history of creationism at its Oakland, California, headquarters. On the web at <http://www.ncseweb.org>.

[Released on November 13, 2007, and reprinted here with slight alterations. For the original, see http://www.ncseweb.org/resources/articles/judgment_day.pdf.]

country. The *York Dispatch*, one of the two daily papers serving the Dover area, editorially offered (2007 Nov 11), “Thumbs Up to PBS for bringing tribulations of the Dover Area School District to national attention in the two-hour Nova special ‘Judgment Day: Intelligent Design on Trial’ ... The blatant attempt to introduce religion-based ‘creationism’ into the public school classroom is detailed along with a recreation of the ensuing battle in a federal courtroom in Harrisburg that resulted in a humiliating defeat for the intelligent design proponents. A

reminder that fiddling with public education to impose an individual religious viewpoint is a non-starter, ‘Judgment Day’ should be required watching.”

Reviewing *Judgment Day* for the *Philadelphia Inquirer* (2007 Nov 13), Jonathan Storm praised not only its scientific content but also its objective approach: “Nova, the science show, stoutly defends science against the attack of the surprisingly hard-to-pin-down intelligent-design brain trust. It does use such loaded words as ‘claim’ and ‘so-called’ to describe tenets of the supposed theory, but

it is surprisingly clear of a ‘nyah-nyah, we won’ tone. That makes this significant program more accessible to all.” He also quoted Judge Jones as saying, “If you glibly embrace intelligent design, or if you’re in that 48 or 50 percent who believe creationism ought to be taught in school, I hope [you] will watch this.”

It was as a legal drama that *Judgment Day* struck Rob Owen, writing in the *Pittsburgh Post-Gazette* (2007 Nov 12). Describing the program as “a fascinating and gripping look at the trial and both sides of the issue,” Owen wrote, “I





Associated Press

didn't know much about so-called 'intelligent design' theory beyond its name and a sense that it's synonymous with creationism. So I went into the film willing to be persuaded that maybe there's some validity to 'intelligent design'. If there is, those in favor of ID failed to prove it. And failed miserably. That's what makes 'Intelligent Design on Trial' such a thriller. As a legal exercise, the pro-evolution team presents a slam-dunk case; in the end, even a defense attorney says his losing side received a fair trial."

In *The New York Times* (2007 Nov 11), Cornelia Dean admired the scientific content of *Judgment Day*, commenting, "the program as a whole recognizes that there is no credible scientific challenge to the theory of evolution as an



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explanation for the complexity and diversity of life on earth. And it shows how witnesses attacked two of the central premises of intelligent design — that there are no 'intermediate' fossils to show one creature morphing into another (there are) and that some body parts are too complex to have formed from the modification of other body parts (not true)." She added, "But viewers also learn a more important lesson: that all science is provisional, standing only until it is overturned by better information. Intelligent design, relying as it does on an untestable

supernatural entity, does not fall into that category."

Elsewhere, the *Cincinnati Post's* reviewer (2007 Nov 13) wrote, "Leave it to the respected PBS science show 'NOVA' to put some common sense back into the often hysterical debate over whether intelligent design is science or religion — and remind us that Darwin's theory of evolution is a solid one that should be taught in science classes." The *Deseret News's* reviewer (2007 Nov 13) described the program as "captivating," and quoted Judge Jones as saying, "I think there's a lesson here for communities and how they elect their school board members." And the *Oregonian's* reviewer (2007 Nov 13) wrote, "'Judgment Day' offers an admirably compact and methodical presentation of the sides in the debate. It should be highly useful in years to come."

Finally, writing on Salon (2007 Nov 13), Gordy Slack, the author of *The Battle Over the Meaning of Everything* (San Francisco: Jossey-Bass, 2007; reviewed in *RNCSE* 2007 May-Aug; 27 [3-4]: 43), looked forward from the trial, explaining that although "intelligent design" aspired to be a big tent under which creationists of all stripes were welcome to shelter, "Judge Jones' [s] decision was like a lightning strike on the big top, sending many of the constituents running home through the rain." He ended by quoting NCSE's executive director Eugenie C. Scott's warning: "Evolution remains under attack ... If creationists have their way, teachers will eventually just stop teaching evolution. It'll just be too much trouble. And generations of students will continue to grow up ignorant of basic scientific realities."

Despite the general acclaim for *Judgment Day*, residents of Memphis, Tennessee, were not able to watch it on the regular, analog, channel of WKNO, the local PBS affiliate. A locally produced documentary about World War II was aired instead. The *Memphis Commercial Appeal* (2007 Nov 15) quoted a spokesperson for the station as explaining, "We had plans to do our local programs to honor veterans this week during Veterans Day. We thought Tuesday night was a good spot for local pro-

grams of this nature, and we were concerned about the controversial nature of the ... program as were 15 percent of the top 50 public television stations in the country."

Although *Judgment Day* was aired on WKNO's digital broadcasts, the station's failure to air it on the regular channel elicited complaints; the spokesperson for the station would not disclose how many. The *Commercial Appeal* quoted one disgruntled viewer, NCSE member David O Hill, as saying, "I really appreciate what service they do, but when they step out of line like this it violates the whole premise of what NPR and PBS stand for nationally ... This was an historical review of an important judicial decision in America, and they chose not to do it." Trained as a biologist, Hill added, "Evolution is as important a building block to biology as atomic theory is to chemistry and gravitation to physics." The station promised to air *Judgment Day* in January 2008, "with a local follow-up to discuss the various views on the show."

Judgment Day is over, but its generous website (<<http://www.pbs.org/wgbh/nova/id/>>) remains, featuring interviews with Kenneth R. Miller on evolution, Phillip Johnson on "intelligent design," and Paula Apsell on NOVA's decision to produce the documentary; audio clips of Judge John E. Jones III reading passages from his decision in the case and of various experts (including NCSE's Eugenie C. Scott) discussing the nature of science; resources about the evidence for evolution and about the background to the *Kitzmiller* case; and even a preview of the documentary. Teachers will be especially enthusiastic about the briefing packet for educators, the teacher's guide, a two-session on-line course, and a number of lesson plans. And the complete show is available for viewing on-line there as well; it was also released as a DVD in February 2008.

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A Victory over “Intelligent Design” in Oklahoma

Daniel Dickson-LaPrade

I first heard that William Dembski was going to visit the University of Oklahoma quite by accident from one of my technical writing students. I was astonished. People still pay the honoraria of “intelligent design” (ID) advocates even after *Kitzmiller v Dover*? Apparently, they do, and after two phone calls I found out who was doing the paying: Trinity Baptist Church. On a “Note from the Elders” on its website, I read that they viewed the expense as a “gospel investment” — part of their attempt “to penetrate the university campus with the gospel,” especially the science departments. “In case you are wondering, these departments and their teachings are not friends of Christianity.”

I quickly contacted every faculty member in our zoology and botany/microbiology departments with news of Dembski’s upcoming visit on September 17, 2007. Several of these faculty members — many of them affiliated with the group Oklahomans for Excellence in Science Education — worked with me to put together a game plan.

We wrote an advertisement which was to appear in the OU student paper on the day of Dembski’s arrival. In this ad, we listed several points showing, first, that evolution is not inherently atheistic, and second, that ID is not a scientific enterprise. Since we put the ad through several drafts to maximize its effectiveness, and since we had to turn in the ad two business days before it was to run, we only had about 48 hours to collect donations to cover the expense of the ad and signatures to appear beneath it. We had expected to get enough money for a half-page ad, along with perhaps a hundred signatures. Instead, we collect-

ed 180 signatures and ample money for the ad to cover a full page.

On the morning of Dembski’s appearance, our ad was augmented by a guest column on the opinion page by OU biologist Douglas Mock, author of *The Evolution of Sibling Rivalry* and *More than Kin and Less than Kind*. Mock’s column argued against ID, while a pro-ID counterpoint column was written by a journalism major.

DEMBSKI’S PRESENTATION

Dembski’s talk was held in an auditorium in our student union. Students posted at the building’s entrances were passing out copies of mathematician Jeffrey Shallit’s expert report in the *Kitzmiller v Dover* trial. In this brief document, Shallit takes Dembski to task for using flawed and nonsensical methodology which has not been utilized by real scientists and mathematicians. Outside the door of the auditorium, the local Christian bookstore had a table of books for sale by various ID advocates, including several titles by Dembski himself. A pamphlet recycling old ID arguments was also provided.

As the last of the auditorium’s 407 seats were filled, an announcer told us that Dembski’s talk would last for about an hour, after which there would be an open question-and-answer session. Two microphones had been set up for this purpose. On the screen was Dembski’s first slide — a quotation from our full-page advertisement about how ID proponents “refrain from publishing their results in peer-reviewed math and science journals.”

Dembski began by saying that no one had ever taken out a full-page ad against him before, and spent the first five or ten minutes of his presentation trying to refute our point about ID’s lack of peer-reviewed publications. As though this helped his refutation, he posted a list of eight such peer-reviewed publications — most of which had nothing to do with ID methodology. The remainder of Dembski’s presentation had all the usual examples and analogies (the bacterial flagellum, Mount Rushmore, the motorcycle engine), as well as stills and clips from films like *This is Spinal Tap* and *Dumb and Dumber*.

Having taught college-level writing classes for several years, and having been a trainer in the corporate world before that, I can tell when a speaker has carefully honed a presentation to razor sharpness and when a speaker is coasting along based on past acquaintance with the material. As far as I could tell, Dembski was phoning in his presentation. This became particularly apparent when Dembski reached the one-hour mark that should have ended his presentation. He began to skip some slides and to skim others. Finally, having gone over on time by fifteen minutes, he skipped virtually all of his last dozen slides to get to his conclusion.

After this, the question-and-answer period started. As lackluster, rushed, and incomplete as the presentation itself was, the question-and-answer period went even more poorly for Dembski. I was first in line to question, and I began by pointing out that there were several tenured science faculty in the room who had, by themselves, exceeded the peer-reviewed publication output for the entire ID movement. A zoology professor pointed out that Dembski had provided no positive evidence for ID and that his analogies for the complexity of living systems were very shabby ones. Then, in the highlight of the evening, a microbiologist on our faculty pointed out numerous errors and distortions in Dembski’s treatment of the bacterial flagellum. In all, some 25 or 30 questioners grilled Dembski over the course of more than two hours, most of them undergraduates and grad students. Only two of the questioners were supportive of ID.

I had expected Dembski’s talk to get a warm reception, and for many people to be fooled into thinking that ID was a worthwhile scientific enterprise. Instead, the the room had almost a carnival atmosphere. Dembski was heckled repeatedly for evading questions and responded to this heckling with further evasion. The audience laughed and applauded often and at length when a questioner put Dembski on the spot. As one of our professors with the Oklahoma Biological Survey later told me, “No one could have come away thinking that it was anything but a complete disaster for Dembski.”



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THE LASTING IMPRESSION

This disaster continued even after Dembski finally went home. In the week after his presentation, the OU student paper published one opinion letter by me, another by a zoology professor, and a guest column by the same microbiology professor who took Dembski to task for his misrepresentation of the bacterial flagellum (*see below*). During this same period, not a single column or letter to the editor in support of ID appeared in the school paper.

All in all, our preparations were successful, and Dembski's visit to the University of Oklahoma did the "intelligent design" movement more harm than good. There is no doubt in my mind that if all presentations by ID proponents went as poorly as Dembski's did and if evolution supporters can organize and coordinate their efforts, then the support for the "intelligent design" movement would simply evaporate.

[See the September 2007 entries on the blogs ERV (<<http://endogenousretrovirus.blogspot.com/>>) and Ontogeny (<<http://mattdowling.blogspot.com/>>), as well as the blogs linked on the September 22, 2007, entry of The Panda's Thumb. Trinity Baptist Church's website hosts (at <<http://www.trinitynorman.org/clientimages/32056/idbooklet9-07.pdf>>) a copy of a pamphlet entitled "Design versus Dogma: A Brief Introduction to Intelligent Design", which was distributed before Dembski's talk.]

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"Intelligent Design" Reflects Human Ignorance

Phillip E Klebba

The fundamental premise of "intelligent design" is the existence of "irreducibly complex biological systems". The idea is that certain natural phenomena are just too complicated to originate by spontaneous, stepwise evolutionary processes. But this argument reduces to another basic principle, aptly illustrated by William A

Dembski's widescreen Rorschach test (the face of a cow), which was passed by only a handful of individuals in the large audience [at Dembski's September 17, 2007, talk at the University of Oklahoma, entitled "Why Atheism is no longer Intellectually Fulfilling"]: the powers of human perception are strongly biased by experience and strictly limited by cognitive ability.

It is ironic that excellent examples of this point derive from the rich history of evolution theory itself. Dembski was correct when he noted that Charles Darwin (in *On the Origin of the Species*, 1859) had no idea of the mechanisms that underlie the process of natural selection that he described. For Darwin, the molecular explanations of organismal evolution were irreducibly complex. It remained for Gregor Mendel's description of inheritance (in *Experiments on Plant Hybridization*, 1866, which became widely accepted about thirty years later) to provide a conceptual framework for the genetic processes that permit natural selection. But Mendel himself had no understanding of the nature of the genetic material.

Again, the irreducible complexity of the subject reared its head and kept science at bay until new technology allowed Rosalind Franklin, James Watson, and Francis Crick to reveal the structure of DNA (for which Watson and Crick won the Nobel Prize in 1953). Still, the organization of nucleic acids into discrete units of information that may be turned on, turned off, and transposed into molecular machines, was beyond their descriptions. It fell to Seymour Benzer, and to François Jacob and Jacques Monod (who shared the Nobel Prize in 1965), to unravel this next piece of irreducible complexity, nearly completing the explanation of the molecular biological and biochemical mechanisms beneath evolutionary change. However, one thing unknown to them was the process of mutation in eukaryotic DNA, that was clarified by Barbara McClintock's studies of gene trans-

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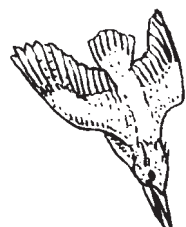
positions (for which she won the Nobel Prize in 1983).

Hence, irreducible complexity is more appropriately called "human ignorance", which retarded the progress of this particular scientific field for over a hundred years. No biologist or biochemist argues that we understand all the mechanisms of nature. Clearly we do not. However, we need not look to "intelligent design" for the explanation of these puzzles, but rather await the progress of human technology and knowledge. It is no accident that these leaps of human understanding win Nobel prizes, the peak of intellectual recognition.

It is relevant to this point that Dembski's education, although extensive (BA, psychology; MS, statistics; PhD, philosophy, University of Illinois, Chicago; PhD, mathematics, University of Chicago; MDiv, Princeton Theological Seminary) does not qualify him to discuss the main subject of his lecture: biochemistry and molecular genetics. Certainly part of his failure to understand the irreducible complexity of biological systems derives from his lack of training in this field.

For example, the evolutionary relationships that led to the bacterial flagellar motor (the poster organelle of irreducible complexity for proponents of "intelligent design") are now well-known among scientists studying the biochemistry of bacterial cell envelopes. In brief, the flagellar assembly, which propels bacteria through fluid environments, consists of a long, hollow polymeric filament, a basal body that holds the filament in the cell membrane system, and a molecular motor complex containing a stator and rotor that turn the filament around and around when it is energized (by proton-motive force). When multiple filaments on the cell surface simultaneously spin in the counterclockwise direction, they form a twirling bundle of filaments that pushes the bacterium forward.

Dembski and at least one biochemist (Michael Behe, Lehigh University) assert that this molecular assembly of about fifty proteins is too complicated to originate by natural selection. In reality, a number of precursors to the complete flagellar assembly are known, which provide



the stepwise development of novel functions, that when juxtaposed together lead to a selectable trait. The emergence of the flagellar motility system involves a progression from (i) pili (a hollow nonrotatory polymeric filament anchored in the bacterial outer membrane, which promotes adherence to surfaces), to (ii) type-III secretory systems (the needle-complex, a hollow, non-rotatory filament anchored by a complete basal body, through which bacteria inject toxins into host cells), that acquired (iii) the proton-motive force-driven rotational capability of the ATP synthase motor (a primary source of energy generation), and (iv) sensory and regulatory systems that determine the direction and the duration of cell propagation. Each individual system, by itself, has survival benefits for the cell; when combined, one by one, they provide a stepwise path to the development of a new advantageous trait: the ability to swim toward something desirable (such as high concentrations of sugars) and away from something noxious (such as high concentrations of acid). This adaptive evolutionary progression is simple and logical, but unfortunately it is not understood by Dembski and his colleagues. (For more information about this subject, please consult MJ Pallen and NJ Matzke, "From *The Origin of Species* to the origin of bacterial flagella," *Nature Reviews Microbiology* 2006; 4: 784-90.)

After considering his academic qualifications, I attended Dembski's lecture with the expectation that I would hear a serious theoretician consider the logical and scientific aspects of an important topic, the origins of biological systems on planet earth. As someone who understands the biochemistry that was the main subject of the lecture, I was surprised to find the discussion much less substantive than I anticipated. It was a bit more like the questions of a teenager than the insights of a philosopher.

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[A version of this article appeared in The Hub, the student newspaper of the University of Oklahoma, 2007 Sep 20.]



David Vitter

The Rise and Fall of the Vitter Earmark

Glenn Branch
NCSE Deputy Director

“Sen David Vitter, R-La., earmarked \$100 000 in a spending bill for a Louisiana Christian group that has challenged the teaching of Darwinian evolution in the public school system and to which he has political ties,” reported the New Orleans *Times-Picayune* (2007 Sep 22). Buried in the Senate Appropriations Committee’s version of the appropriations bill for the departments of Labor, Health and Human Services, and Education was a provision allocating funds to the Louisiana Family Forum (LFF) of Baton Rouge “to develop a plan to promote better science education.”

In a written statement, Vitter explained, “This program helps supplement and support educators and school systems that would like to offer all of the explanations in the study of controversial science topics such as global warming and the life sciences.” The *Times-Picayune* added, “The money in the earmark will pay for a report suggesting ‘improvements’ in science education in Louisiana, the development and distribution of educational materials and an evaluation of the effectiveness of the Ouachita Parish School Board’s 2006 policy that opened the door to biblically inspired teachings in science classes.”

Adopted in 2006 with the backing of the LFF, the Ouachita Parish School Board’s policy permits teachers to help students to understand “the scientific strengths and weaknesses of existing scientific

theories pertinent to the course being taught;” “biological evolution, the chemical origins of life, global warming and human cloning” are the only topics specifically mentioned. A local paper editorially described it as “a policy that is so clear that one School Board member voted affirmatively while adding, ‘but I don’t know what I’m voting on’” (*Monroe News-Star*, 2006 Dec 3; see *RNCSE* 2006 Nov/Dec; 26 [6]: 8-11).

Although the Ouachita policy reflects the stealth creationist campaign of “teach the controversy,” the LFF is not always so coy. The *Times-Picayune* reported: “Until recently, its Web site contained a ‘battle plan to combat evolution,’ which called the theory a ‘dangerous’ concept that ‘has no place in the classroom.’ The document was removed after a reporter’s inquiry.” (That document was written by Kent Hovind, the flamboyant young-earth creationist who is currently serving a ten-year sentence in federal prison for tax evasion and obstruction of justice; see *RNCSE* 2006 Jul/Aug; 26 [4]: 12-3.) The LFF also distributes “addenda” for science textbooks that promote various creationist claims, including the “irreducible complexity” of the bacterial flagellum and flood geology.

Writing in the New Orleans *Times-Picayune* (2007 Sep 26), columnist James Gill took Vitter to task for his proposal. The Louisiana Family Forum, Gill observed, “has said the theory of evolution ‘has no place in the classroom’ and has blamed Charles Darwin for Hitler, Stalin and Pol Pot.” “The Web site,” he added, “leaves no doubt that they would ban evolutionary theory altogether if they could; there is no incentive to give equal billing to what they see as heresy.”

Concerned about Vitter’s earmark, a coalition of more than thirty religious, civil rights, education, science, and advocacy organizations, spearheaded by Americans United for Separation of Church and State and including NCSE, sent a letter to every member of the Senate, calling on them to oppose the Vitter earmark. The letter (see sidebar, p 10-1) argued, “Not only would granting federal funding for the LFF’s program be unconstitu-

tional, it also would be bad policy that would infringe upon students' religious freedom and undermine their education in the important discipline of science."

People for the American Way (PFAW) sent its own letter opposing the earmark. In a press release dated October 17, 2007, PFAW's Director of Public Policy Tanya Clay House described the earmark as

"completely inappropriate," adding, "Sending taxpayer money to a religious group whose mission is to force creationism into public schools as science is a blatant attack on the separation of church and state. Claiming that the money will be spent on improving science education adds insult to injury."

Additionally, NCSE e-mailed its members and friends in Iowa,

Pennsylvania, West Virginia, and Mississippi to urge them to lobby Senators Tom Harkin, Arlen Specter, Robert Byrd, and Thad Cochran to remove the Vitter earmark. (Due to their positions on the Appropriations Committee and its Subcommittee on Labor, Health and Human Services, Education, and Related Agencies, these senators were in a position to wield the

REMOVE UNCONSTITUTIONAL "CREATION SCIENCE" EARMARK FROM

Dear Senator:

We, the undersigned religious, civil rights, education, science, and advocacy organizations[,] write to urge you to remove an earmark from the Fiscal Year 2008 Departments of Labor, Health and Human Services, and Education, and Related Agencies Appropriation Bill's Committee Report. The Fund for Improvement of Education, under Title III, contains an earmark for uses that, if funded, would be blatantly unconstitutional. The earmark would fund curriculum that promotes teaching creationism in the science classroom, even though uniformly prohibited by federal courts.

The requested funding would go to the Louisiana Family Forum (LFF) "to develop a plan to promote better science education." According to *The New Orleans Times-Picayune*, the earmark "will pay for a report suggesting 'improvements' in science education in Louisiana, the development and distribution of educational materials and an evaluation of the effectiveness of the Ouachita Parish [Louisiana] School Board's 2006 [science curriculum] policy."¹

The Louisiana Family Forum's mission is ... "persuasively [to] present biblical principles in centers of influence," including schools.² One way the LFF seeks to accomplish its mission is by advocating for teaching creationism in the science classroom. For instance, the LFF played a leading role last year in Ouachita Parish, Louisiana School Board's adoption of a "science curriculum policy"³ that "opened the door to biblically inspired teachings in science class."⁴ The policy uses a creationist ploy — "teaching the controversy" — that allows teachers to point out the alleged "weaknesses" of evolutionary theory. This is despite the fact that courts have consistently held this tactic to be unconstitutional and that "the scientific consensus around evolution is overwhelming."⁵ Constitutional and scientific issues aside, underwriting LFF's study of this questionable "science curriculum policy" for which it has already been a vigorous advocate is a dubious use of federal funding, to say the least.

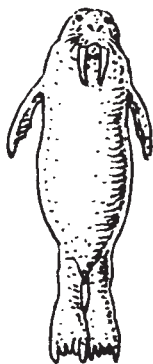
Another LFF strategy in its quest to bring creationism to science class is promoting creationist "addenda" (deceptively called "evolution addenda") that public-school teachers can use to supplement state-approved science textbooks. One such addendum, published by the LFF as a "Fact Sheet," promotes discredited arguments from both the young-earth and intelligent-design creationist movements.⁶ Among other constitutional problems, the addendum substitutes biblical explanations for scientific ones by attributing the "billions of fossils" on Earth to "violent floods in the past" and by questioning whether chemical origins of life happened "accidentally" or "by purely natural processes." Moreover, alluding to supernatural explanations under-

mines modern scientific methodology, in which scientists seek natural rather than supernatural explanations.⁷

This addendum was written by Dr Charles H Voss, a retired electrical engineering professor and close ally of the LFF. Voss is also vice president of the young-earth creationist Origins Resource Association (ORA), which is devoted to bringing creationism into science classes.⁸ Voss has written similar, equally problematic, addenda for Louisiana's state-approved biology textbooks. They are available at his website, TextAddOns.com, to which the LFF posts a link. He authored an ORA "pamphlet outlining Scriptural and scientific arguments showing that God did NOT use evolution as His method of creating."⁹ His addenda are clearly among the "improvements" in science education and "educational materials" for which the LFF advocates — and for which the US Constitution forbids taxpayer funds to be spent. There is no doubt that the LFF's intent is to bring creationism into science classrooms with federal taxpayer dollars.

The federal courts, including the US Supreme Court, have consistently and repeatedly held that creationism in all its variations ("creation science," "young-earth creationism," "intelligent design," and other anti-evolution doctrines) cannot be taught in the public schools. In *Epperson v Arkansas*,¹⁰ the Supreme Court struck down a state statute prohibiting the teaching of evolution in public schools, explaining that "the First Amendment does not permit the State to require that teaching and learning must be tailored to the principles or prohibitions of any [religion]."¹¹ Subsequently, in *Edwards v Aguillard*,¹² the Supreme Court invalidated a Louisiana statute requiring the "balanced treatment" of evolution and "creation science" in the public schools. The Court declared the law unconstitutional because its "preeminent purpose ... was clearly to advance the religious viewpoint that a supernatural being created humankind."¹³

Other courts have similarly invalidated public schools' attempts to teach thinly disguised religious beliefs regarding the origins of life.¹⁴ Most recently, the court in *Kitzmiller v Dover*, joined by local, national, and international media, recognized that the school board in Dover diserved the students, parents, and teachers in the community by dragging them into a "legal maelstrom, with its utter waste of monetary and personal resources."¹⁵ Federal funding of the LFF's efforts to introduce creationism in public-school science classrooms will similarly harm the religious liberty of students and their families. As the Supreme Court has explained, the "preservation and transmission of religious beliefs and worship is a responsibility and a choice committed to the private sphere," for "religious beliefs and



greatest influence on the final form of the bill.)

The protests were apparently heeded, for Vitter withdrew the earmark on the Senate floor on October 17, 2007, even while insisting that the money was not aimed at promoting creationism and describing the concerns as “hysterics.” According to the Congressional Record, Vitter said:

The project, which would develop a plan to promote better science-based education in Ouachita Parish by the Louisiana Family Forum, has raised concerns among some that its intention was to mandate and push creationism within the public schools. That is clearly not and never was the intent of the project,

nor would it have been its effect. However, to avoid more hysterics, I would like to move the \$100 000 recommended for this project by the subcommittee when the bill goes to conference committee to another Louisiana priority project funded in this bill.

Senators Tom Harkin (D-Iowa) and

LABOR/HHS/EDUCATION APPROPRIATIONS REPORT

religious expression are too precious to be either proscribed or prescribed by the State.”¹⁶ Parents — not schools — have the right to direct the religious upbringing of their children. Our nation is becoming more and more religiously diverse and Louisiana’s students and their families reflect this diversity. One specific religion’s view of the origins of life should not be taught to the exclusion of others. Doing so sends the message to those who disagree “that they are outsiders, not full members of the [school] community, and an accompanying message to adherents that they are insiders, favored members of the [school] community.”¹⁷

Finally, federal funding of the LFF will weaken rather than strengthen science education. “Creationism, intelligent design, and other claims of supernatural intervention in the origin of life or of species are not science because they are not testable by the methods of science.”¹⁸ Including these religious ideas in science classes “compromises the objectives of public education”¹⁹ and negatively affects students. Teaching creationism “threaten[s] ... students’ understanding of the biological, physical, and geological sciences” and “deprive[s] students of the education they need to be informed and productive citizens in an increasingly technological, global community.”²⁰ The scientific literacy of students is at risk, which in turn puts our nation’s competitiveness and ability to continue to achieve major advances in technology and public health at risk.

Not only would granting federal funding for the LFF’s program be unconstitutional, it also would be bad policy that would infringe upon students’ religious freedom and undermine their education in the important discipline of science.

We urge you to remove this harmful and unconstitutional earmark.

Sincerely,

American Association of School Administrators
American Association of University Women
American Civil Liberties Union
American Humanist Association
American Institute of Biological Sciences
American Jewish Committee
American Jewish Congress
Americans for Religious Liberty
Americans United for Separation of Church and State
Anti-Defamation League
Baptist Joint Committee for Religious Liberty
Biological Sciences Curriculum Study
Center for Inquiry
Colorado Evolution Response Team
Disciples Justice Action Network
Equal Partners in Faith

Jewish Council for Public Affairs
Kansas Citizens for Science
National Center for Science Education
National Council of Jewish Women
National Education Association
National Science Teachers Association
Oklahomans for Excellence in Science Education
Organization of Biological Field Stations
Protestant Justice Action
Secular Coalition for America
Sikh Council on Religion and Education
Society for the Study of Amphibians and Reptiles
Society for the Study of Evolution
Texas Faith Network
Texas Freedom Network
The Herpetologist’s League
The Interfaith Alliance
Union for Reform Judaism
Unitarian Universalist Association of Congregations
Women of Reform Judaism

1 Bill Walsh, *Vitter Earmarked Federal Money for Creationist Group*, New Orleans Times-Picayune, Sept 23, 2007, at 1.

2 <<http://www.lafamilyforum.org>>

3 <http://www.opsb.net/downloads/forms/Ouachita_Parish_Science_Curriculum_Policy.pdf>

4 Walsh, *supra*.

5 *Science and Creationism: A View from the National Academy of Sciences* (2d ed. 1999), <<http://www.nap.edu/html/creationism/appendix.html>>

6 <<http://www.lafamilyforum.org/site10001/1001014/docs/origin-1.pdf>>

7 *Science and Creationism*, <<http://www.nap.edu/html/creationism/evidence.html>>

8 <<http://originsresource.org/>>

9 <<http://originsresource.org/pubs/didgod.pdf>>

10 393 US 97 (1968).

11 *Id.* at 106.

12 482 US 578 (1987).

13 *Id.* at 591.

14 See *Freiler v Tangiparola Parish Bd of Educ*, 185 F3d 337, 348 (5th Cir 1999) (striking down an oral disclaimer casting doubt on evolution and referring to “biblical” alternatives), *cert denied*, 530 US 1251 (2000); *Peloza v Capistrano Unified Sch Dist*, 37 F3d 517, 522 (9th Cir 1994) (holding that a science teacher was properly required by his school district to teach evolution and refrain from discussing his religious views); *Daniel v Waters*, 515 F2d 485, 491 (6th Cir 1975) (striking down statute requiring schools teaching evolution to devote equal time to other theories, including Biblical account of creation); *Kitzmiller v Dover Area Sch Dist*, 400 FSupp. 2d 707 (MD Pa 2005) (holding that intelligent design, an “untestable alternative hypothesis grounded in religion” cannot be taught alongside evolution in the science classroom, nor can evolutionary theory, “well-established scientific propositions,” be misrepresented); *Selman v Cobb County Sch Dist*, 390 F Supp 2d 1286, 1312 (ND Ga 2005) (striking down a textbook disclaimer sticker telling students that evolution is “just a theory”), *vacated and remanded by* 449 F3d 1320 (11th Cir 2006); *McLean v Ark Bd of Educ*, 529 F Supp 1255, 1258-64 (ED Ark 1982) (holding that teaching creation science in public schools unconstitutionally advances religion).

15 *Kitzmiller*, 400 F Supp 2d at 765.

16 *Lee v Weisman*, 505 US 577, 589 (1992).

17 *Santa Fe Indep Sch Dist v Doe*, 530 US 290, 309-310 (2000) (quoting *Lynch v Donnelly*, 465 US 668, 688 (O’Connor, J concurring)).

18 *Science and Creationism*, <<http://books.nap.edu/html/creationism/conclusion.html>>

19 *Id.*

20 Am Assoc for Advancement of Sci, *Statement on the Teaching of Evolution* (Feb 16, 2006), <http://archives.aaas.org/docs/resolutions.php?doc_id=443>.

[See <http://www.au.org/site/DocServer/2007-10-17_Letter_re_Vitter_Earmark_-_Final.pdf?docID=2041> for the original.]



Arlen Specter (R-Pennsylvania), the floor managers of the appropriations bill, accepted Vitter's proposal and agreed to move the funds to a different project in Louisiana when the bill is in its conference committee.

Barry Lynn of Americans United for Separation of Church and State, applauding the removal of the earmark in a press release dated October 18, 2007, commented, "If [Senator] Vitter's aim was to improve science education in Louisiana, I have to wonder why he did not direct these funds to a scientific group or a museum." He added, "Boosting science education is an odd task for a religious group."

"Senator Vitter's defense of the earmark is obviously disingenuous, given the Louisiana Family Forum's record of fighting tooth and nail against evolution education," commented NCSE's executive director Eugenie C. Scott. "But I'm glad to see that, with the removal of his earmark, public funds are not going to be misused to miseducate the children of Louisiana about the science of evolution."

Not all fears were allayed, however. The Baton Rouge *Advocate* reported (2007 Oct 20) that Vitter wanted to redirect the funds of the earmark to science and computer labs in Ouachita Parish schools, which prompted Barbara Forrest — a native of Louisiana and a member of NCSE's board of directors — to worry, "The money is just being moved around ... All the signs indicate that it could be used for its initial purpose." Representatives of People for the American Way and the ACLU echoed her concern.

In a subsequent letter to the *Advocate* (2007 Oct 25), Forrest contended that the redirection of the funds to Ouachita Parish was suspicious, given the LFF's support of the stealth creationist policy there. Quoting LFF Director Gene Mills's statement that the LFF "wasn't disappointed with the funding change and encouraged Vitter to redirect it," she remarked, "Given LFF's alliance with the Ouachita Parish School Board, we should take him at his word," and warned, "The LFF will make sure this battle doesn't go away."

But Forrest's concerns were

overtaken by events. Shorn of the Vitter earmark, the appropriations bill passed the Senate, proceeded through a conference committee, and was ultimately vetoed, on November 13, 2007, by President Bush.

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The History of Life as a Walk in the Park

Andrew J. Petto

A recurring theme for science educators is how to make the vastness of the history and diversity of life "real" for students. In their classrooms, they devise clock models, modified calendars, and even use 1000-sheet rolls of toilet tissue to emphasize the deep history of life on earth and the variety (and success) of the many forms of life that have appeared during that time.

In the fall of 2007, artist J. Nicholas Schweitzer set up an installation in a public park in Madison, Wisconsin. The installation consisted of fifteen signposts depicting significant events in the history of life with illustrations of life forms that emerged and flourished in association with certain "milestones" — for example, the emergence of the first plants and animals onto land or the first appearance of primates. In addition, the stations are spaced in such a way so that the distance between them is in proportion to the amount of time that passed between the milestones. So, for example, the distance representing the one billion years from the formation of the earth to the first record of unicellular life is about

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A park visitor stops to consider Station 6: Reptiles Become Dominant, 270 mya, as viewed from Station 5: Plants and Amphibians Come onto Land, 400 mya

half as long as the distance between the first unicellular life and the diversification of multicellular organisms almost two billion years later in the late Precambrian.

For those familiar with the exhibit "A Walk Through Time" created in the 1990s at Hewlett-Packard by Sidney Liebes and his colleagues (Liebes and others 1998), Schweitzer's installation recalls the value in adding the "kinesthetic" dimension to the learning experience. It is almost as though having to travel in space and take time to reach the next milestone in the history of life imparts a deeper appreciation for the length of time between events.

Although the "Walk Through Time" exhibit was about twice as long — extending for about a mile — it consisted largely of displays to view and read. Schweitzer's exhibit added two significant dimensions to the approach that Liebes and colleagues pioneered. First, each station contains both a cover page created by the artist and several illustrations composed by students at Van Hise Elementary



Rendition of Station 5: Plants and Amphibians Come onto Land, 400 mya, by a student at Van Hise Elementary School, Madison WI.



View of the last 400 million years of the installation showing containers for sidewalk chalk for inspired viewers to use

and Velma Hamilton Middle Schools in Madison. The children's renditions show their engagement in the materials and their creative responses to the idea of the evolution of life. Perhaps the most interesting are the drawings at the last station of the installation where children speculate artistically to create their answers to the question: "What's next?"

A second added dimension is an invitation for those experiencing the exhibit to stop and draw their own impressions on the sidewalk next to the exhibit. Schweitzer provided a container with several large sticks of sidewalk chalk for this purpose. During the several visits that I made to the exhibit, there were always fresh drawings — and it may be serendipity that the chalk used to make the drawings was itself made from the preserved remains of organisms featured in some of the installations' stations. One of these visitors' drawings can be seen on the cover of this issue.

Exhibits of this type are temporary, so there will soon be no trace of the installation. But the work of the children who were a part of the exhibit and the drawings on the sidewalk alongside the installation both clearly show how successfully this artist connected the idea of evolution and the deep history of life on earth with several audiences. This exhibit certainly makes it clear that innovative, creative ways of helping children (and the general public) engage and understand evolution are valuable — even without a giant carnivorous dinosaur or a fossil hominin to excite and amaze. Schweitzer's exhibit, by contrast,

was almost contemplative in tone, inviting the viewer to stop and commune for a while with ancient life forms that lived in a world we can only imagine.

[For readers not able to view Schweitzer's exhibit in person, there are photos of the exhibit available on-line at <<http://www.uwm.edu/~ajpetto/Rennebom/Rennebom.htm>>. There are two virtual tours of the original "Walk Through Time", which lack the kinesthetic dimension of walking the history of life, but show the main graphics and text and give some of the history of the Walk. Visit <http://conexions.org/wtt/walk_menu/3700.html> or <http://www.globalcommunity.org/wtt/walk_online.shtml> to take the virtual Walk.]

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Creationism in the Russian Educational Landscape

Inga Levit, Uwe Hoßfeld,
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Two symbolically connected events took place in different parts of the world in 2007. In the United States, Petersburg,

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Kentucky, was the site of the newly created "Creation Museum", while at approximately the same time a federal court in St Petersburg, Russia, tried a case in which a school girl, Maria Schreiber, demanded that the ministry of education must allow an "alternative" to evolution to be taught in high school biology classes. The St Petersburg case would not deserve much attention, if it did not reflect the tensions which have accumulated in Russian society after the breakdown of the USSR in 1991.

Even though most *RNCSE* readers think of creationism as a North American phenomenon, advocates of so-called "scientific creationism" are currently very active worldwide. This movement was imported to Russia after perestroika. Important books in the American and Western European "scientific creationism" tradition have been translated into Russian. In Russia, representatives of both the Russian Orthodox Church (ROC) and of some Protestant churches advocate creationism, even though both confessions arrive at this position independently and remain faithful to their theological doctrines. The ROC (to which 58% of the Russian population belongs) has no officially declared position towards "scientific creationism". The latter plays no significant role in official theological discourse, but unofficially remains a significant part of the Orthodox theological landscape. The ROC, of course, has a strong centralized organization, but Protestant denominations have also founded creationist centers throughout the former Soviet Union.

The story of the St Petersburg case began as Maria Schreiber went to court to force the Ministry of Education to allow an "alternative" to evolution to be taught in high school biology classes (Levit and others 2006). The journal *Gazeta.ru* (2006 Oct 27) reported from the court that one issue was the textbook used for senior high school biology, *General Biology* by Sergei Mamontov, in which the biblical creation story was called a "myth". Schreiber (through her lawyer Konstantin Romanov, a remote descendant of the last Russian Tsar, Nikolai II) demanded an apology from the author and from the Ministry of Education. In a com-

ment, Andrei Fursenko, the Russian Minister of Education and Science, expressed his support for the creationists in that he welcomed the teaching of “alternative ideas” in school (*Rosbalt*, 2007 Jan 3).

The defense pointed out that Mamontov’s textbook does in fact mention creationist concepts, such as the ideas developed by the French comparative anatomist Georges Cuvier (1769–1832) in the early nineteenth century. It was also pointed out that the textbook corresponds to the secular nature of the Russian educational system in that it does not contain religious teachings and that a scientific theory by its very nature cannot hurt religious sensibilities. Even though the court turned down Maria Schreiber’s complaint on February 21, 2007, it is clear that the St Petersburg case shows many similarities to the recent lawsuits in the US. In both countries, creationists have attacked a secular school system because they wanted “alternatives” to evolution to be taught. In both cases the courts have prevented the integration of biblical stories into the teaching of science in school, and thereby defended the secular nature of the state school systems.

However, unlike in the US, where criticism of evolution and demands for “equal time” for the biblical creation story in schools are articulated mostly by evangelical groups, in Russia the traditional Orthodox Church also supported this attack on the secular education system. During the legal proceedings, the plaintiff suggested a replacement for Mamontov’s textbook, written from an “Orthodox” creationist position by Sergej Vertjanov (2005), in which the biblical story is presented as an alternative to evolution. And this is just one of a number of “Orthodox” and non-Orthodox creationist textbooks currently on the market in Russia. His Holiness Alexij II, Patriarch of Moscow and All Russia, recently stated in a lecture in the Kremlin: “Those who want to believe that they are descended from apes, should do so, but they should not force their opinion upon others” (*Die Presse.com*, 2007 Feb 6).

“ALTERNATIVE” TEXTBOOKS

The publication of creationist literature in Russia was pioneered by Protestant churches, which serve only about 2% of the Russian population. In the 1990s translations of several creationist biology textbooks appeared. The publishing house The Protestant alone has translated books by European and American creationists (for example, Gish, Ham, Snelling, Wieland, Morris, Clark, Junker, and Scherer). Most of the books achieve copy runs of about 10 000, which is a lot by Russian standards.

One of the non-Orthodox creationist textbooks published was a translation of a “critical textbook of evolution” originally written in German by Reinhard Junker and Siegfried Scherer (1997; see Kutschera’s “The basic types of life”, *RNCSE* 2006 Jul/Aug; 26 [4]: 31–6). This book repeats some statements from “ordinary” textbooks of evolution, but at the same time calls into question the major claims of modern evolutionary theory. For example, it repeats the creationist conception that microevolution and macroevolution are separate, unrelated processes and that even the most primitive living organisms are so complex that they cannot have evolved by random mutations and natural selection. At the same time, this book, as is characteristic of the works by the “intelligent design” movement targeted at the general public, contains no direct appeals to confessionally determined statements: although the reader is given the impression that science is impotent and incomplete without religious beliefs, specific appeals to particular religious doctrines are difficult to pinpoint.

By contrast, the Orthodox creationist writers, who became active in the second half of the 1990s, have chosen another tactic. They very clearly articulate positions in keeping with Orthodox theology. One of the early attempts to present an Orthodox view on school biology was articulated, for example, by Father Timofej Alferov, whose book bylines simply read “Father Timofej” (Alferov 1996, 1998a, 1998b).

The books were strongly criticized by scientists (for example, Eskov 2000; Borisov 2001; Surdin

2001). In addition to pointing out that the books spread religious ideology in the guise of a science text, the critics also identified many factual errors in the textbooks. This is not surprising, since Alferov, who holds a diploma in thermal physics (in addition to his theological credentials), clearly writes about biological issues from outside his field of competence.

Vertjanov’s textbook (2005), presented during the Schreiber proceedings, illustrates the newest generation of creationist textbooks in Russia. The book concentrates exclusively on biology, is well illustrated, and combines “Orthodox” interpretations with quite traditional biological passages. The structure of the textbook copies the structure of secular textbooks and corresponds to Russian educational standards. The difference between “Orthodox” and secular views becomes evident only in the final sentences of each chapter, where one can read, for example, “[the] wonderful properties of the DNA should induce us to think about the Creator” or “biocoenoses [ecosystems] present harmonic systems of organisms, where certain species and communities cooperate wonderfully with the others demonstrating the wholeness and interconnectedness of the blessed world” (Vertjanov 2005: 301). The textbook also includes a supplement with quotations from the Holy Fathers, which can be related to biological problems.

The most outright creationist part of the book is found in chapter 4, which is devoted to the origin of life and includes a section entitled “The Hypothesis of Evolution and the Creation of the World”. As in other creationist books, the author argues that there are no “transitional forms” in the fossil record and that there is a “plan of creation” that determines the real course of “evolution”. The intention of the chapter is evidently to discredit the theory of evolution and the “materialistic worldview” using both theological and “scientific” arguments. “There are a few qualified biologists who are still convinced of the evolutionary-materialist version of the origin of life” (Vertjanov 2005: 198). Just like his American and European colleagues, Vertjanov argues that the earth was



created in six days. Summarizing the ages of all 23 generations from Adam to Joseph, he concludes that the earth is about 7500 years old. The author also claims, without showing any evidence, that “contemporary science slowly comes to the acceptance of every word of the Holy Bible” (2005: 224).

Like his colleagues from the American Creation Museum, Vertjanov also claims that dinosaurs co-existed with ancient humans. Vertjanov also contributes to the “scientific” description of the world before the Fall when he reconstructs the food chains in Paradise. One of his ideas is that mosquitoes before the Fall obtained necessary hemoglobin from plants (instead of animals), which “should have been very rich in it”. Although Vertjanov’s textbook was not recommended by the Ministry of Education, it is used both in private schools and in some state schools. For example, it is used in Moscow in the private grammar schools Jasenevo and Saburovo and, as an experiment, in State School Nr 262 (Zheleznyak 2005).

It is notable that Vertjanov’s textbook was subject to criticism not only by scientists (Mamontov 2005) but also by some Orthodox theologians. At present, conflicting positions regarding evolution seem to exist within the ROC. So-called “Orthodox creationists” reject the theory of evolution completely based on theological and pseudoscientific arguments. The “Orthodox evolutionists” interpret evolution as the continuation of divine creation. The transition from the lifeless to the living world and from animal to human are interpreted as acts of direct divine creation (Levit 2003, 2006). Even though neither of these schools of thought actually welcomes Darwinism and the theory of natural selection, the difference is that “evolutionists” do not reject evolution, but give it another (partly theological) explanation that would be comparable to the position of many “theistic evolutionists” in the US. The radicals, like Vertjanov, deny the very fact of evolution.

THE ROC WEIGHS IN

The first author interviewed the archpriest AV Skripkin, who repre-

sented the Orthodox Church during the Maria Schreiber proceedings in St Petersburg, to learn more about the position of the Church towards creationism in schools. The archpriest is generally very positive towards the initiative of the schoolgirl and her lawyers. In his view Darwinism is a kind of pseudoscientific mythology. It is responsible for the positivism and progressivism in the modern worldview and therefore also for the anti-human catastrophes of the twentieth century. The problem of Darwinism is not a scientific issue, Skripkin continued, it is a worldview. The choice between creationism and Darwinism is the choice between “divine humanity” and “human animality”.

At the same time, Skripkin emphasizes that the Bible never has been, and never will be, a chemistry textbook. There must be a borderline between science and religion and each should do its job. Skripkin, however, welcomes Vertjanov’s textbook and maintains that this textbook can be used not only in Orthodox but also in state grammar schools. It is his personal view, Skripkin stressed, because the Church has no ultimate doctrine about this issue.

Skripkin, along with many other Orthodox leaders, wants a high profile of Orthodox religiosity in all schools. In addition to trying to squeeze religious beliefs into the biology classes, the Orthodox Church also tries to make religious teaching compulsory in state schools. The most debated issue in this respect is whether to introduce a new course, “The Basics of the Orthodox Culture”, in Russian schools. In 2002 the federal Ministry of Education published a letter to the education departments of the local governments with recommendations on how to establish the new optional course “The Basics of the Orthodox Culture” (Ministry of Education 2002). The course should be taught at all stages of the school system (from elementary to high school) and include issues such as “The Orthodox worldview”, “The Orthodox way of life”, “God and Creation”, “The Natural and Supernatural Worlds”, and so on. Proposed test questions include,

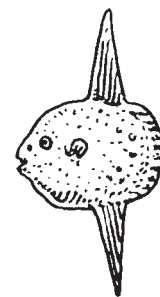
for example, “What did God create first?” Although this course caused sharp debates in Russian society, it was established in many schools. For example, in 2003, 70% of the schools in the Belgorod region already had the new course in their curricula.

As a reaction to the growing clerical influence on education, ten Full Members of the Russian Academy of Science — including two Nobel Prize winners (Vitaly Ginzburg and Zhores Alferov) — published a letter to President Vladimir Putin that warned against making “The Basics of the Orthodox Culture” a compulsory element of federal education programs (BBC Russian Service 2007). The academicians not only argued that theology is mixed with science, but also pointed out that making such a course compulsory in a multi-confessional country would lead to ethnic tensions.

Indeed, Orthodox creationism in all its forms is confronted not only by atheist movements and scientists, but also by the Muslim communities. Thus Nafigullah Ashirov, chairman of the Moslem Board for the Asian part of Russia, criticized the plans of the Orthodox Church sharply, arguing that it could lead to ethnic conflicts as well.

CONCLUSIONS

Our overview of the modern Russian educational landscape reveals several trends relevant to the understanding of creationist movements in modern societies based on science and technology. We distinguish two major types of creationism, which we conditionally label “scientific creationism” and “clerical creationism”. The ordinary “clerical” creationism assumes that the entire world and its biological diversity is a result of supernatural activity and thus makes any discussion of natural causes meaningless. “Scientific creationism”, in contrast, tries to incorporate religious elements into scientific theories as an auxiliary but unavoidable element of explanation. It is characteristic of this kind of proposals that they include elements immune to any kind of scrutiny or criticism. “Scientific creationism” in Russia attempts to act in a “confes-



sion-neutral” manner as, for example, the adherents of the ID movement do. It is, however, common for authors to propagate a particular religious view in educational texts. The purpose of “scientific creationists” is to “infect” the reader implicitly with the idea that science is helpless when faced with the “ultimate questions” related to the meaning and purpose of life and our existence. Biology, they want to prove, is even incapable of explaining biological evolution, that is, of fulfilling its most fundamental purpose.

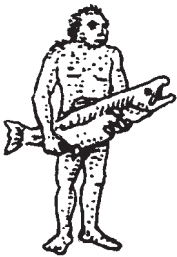
“Scientific creationism” initially came to Russia in the form of translated texts by Western Protestant creationists and members of the ID movement. Because the most important creationist arguments are of a universal anti-scientific nature, they are easily converted into any cultural context and were able therefore to influence the Orthodox creationists, who saw them as useful in their doctrinal

attack on secular education. They can nevertheless be seen as a part of the international creationist movement and their arguments are directed towards the broadest possible audience.

Encouraged by the successes of the “scientific creationists” and by the growing influence of the Orthodox Church in Russia, the ordinary “clerical creationists” also strengthened their efforts to give Russian education clear confessional colors, thereby changing the educational landscape. The “clerical creationists” apply a different strategy than the “scientific creationists” consisting of two parallel tactics. The first tactic is trying to make religious education with an Orthodox bias part of the *compulsory* curriculum. The course “The Basics of the Orthodox Culture” for ordinary schools is an example of this tactic. The second tactic is intervention into areas of science important for shaping the worldview of modern man. The produc-

tion of new “Orthodox” science textbooks and participation in the Maria Schreiber trial are examples of this second tactic.

Thus to a certain extent the strategies of the “scientific creationists” and the “clerical creationists” do not contradict each other and can co-exist peacefully in the same educational context as long as they face a common enemy: evolution. Both in Europe and in North America, it is biology — and particularly evolution — that is the primary target of creationism. Since the creation story takes up only a few pages of the Bible, and the rest is the history of the “holy people”, one might therefore expect that the main attack would be against secular *historical* education, not against one of the natural sciences. But the crucial role biology, and especially evolutionary theory, plays as part of the modern scientific worldview has made it into an arena for major educational battles. This is the case in Russia much as it



D JAMES KENNEDY DIES

D James Kennedy, the megachurch pastor and religious broadcaster, died on September 5, 2007, at the age of 76 in Fort Lauderdale, Florida, according to the *Washington Post's* obituary (2007 Sep 5). Born in 1930 in Augusta, Georgia, and reared mainly in Chicago, he was managing a dancing school in Tampa when he experienced a religious conversion, leading him to earn a divinity degree from Columbia Theological Seminary in Decatur, Georgia. (He later also earned a master's degree in theology from the Chicago Graduate School of Theology and a PhD from New York University, with a 1979 dissertation on the history of Evangelism Explosion, a program which he himself developed for training laypeople to spread the gospel.) In 1959, Kennedy returned to Florida, where he founded Coral Ridge Presbyterian Church, now housed in a 2500-seat edifice in Fort Lauderdale. He expanded his efforts to the airwaves with the founding of Coral Ridge Ministries in 1974; it is currently claimed to reach three million people across the United States. He also was responsible for Knox Theological Seminary (founded in 1989), the Center for Reclaiming America for Christ (founded in 1996 and disbanded in 2007), which aimed to recruit conservative Christians for grassroots activism, and the D James Kennedy Center for Christian Statesmanship (founded in 1995), which engages in outreach to public servants in Washington DC.

A dedicated young-earth creationist, Kennedy

often preached against evolution. In his *Anti-Evolution: A Reader's Guide to Writings Before and After Darwin* (Baltimore [MD]: Johns Hopkins University Press, 1992), Tom McIver describes a 1986 pamphlet based on one of his sermons as “delivered with great confidence and authority, yet ... filled with highly misleading distortions and outright falsehoods.” Between 2004 and 2007, the Creation Studies Institute (founded in 1988 by Tom DeRosa) was part of Coral Ridge Ministries. Kennedy also supported the young-earth creationist movement at large, delivering the keynote address at the 1986 International Creationist Conference and serving as the honorary chairman of Answers in Genesis's Creation Museum. Yet he was open to promoting “intelligent design” creationism as well, featuring Phillip Johnson, Michael Behe, and William Dembski on his radio broadcasts, and selling a variety of “intelligent design” material through Coral Ridge Ministries. Kennedy's diatribes commonly emphasized the evil supposedly due to the evolutionary sciences, culminating in the 2006 polemic *Darwin's Deadly Legacy*, a broadcast featuring “14 scholars, scientists, and authors who outline the grim consequences of Darwin's theory of evolution and show how his theory fueled Hitler's ovens.” The show was denounced as “outrageous and shoddy” by the Anti-Defamation League, and Francis Collins, who was unwittingly interviewed for it, described it as “utterly misguided and inflammatory”.

is in the rest of the world. As long as schools teach evolution as a fundamental theme in biology, religious anti-evolutionists will join together as allies in the battle to remove or neutralize it — even when these allies are themselves deeply divided over religious doctrine and theology. Even though the short-term goal of removing evolution causes the coalition to de-emphasize the longer-term sectarian objectives, they are simmering just below the surface and present a clear and present danger to the nature of public education in Russia just as they do in other parts of the world.

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Political Science: Presidential Candidates' Views

Andrew J Petto

On January 4, 2008, the journal *Science* published a ten-page special report on the views of nine US presidential candidates on a variety of issues that require an understanding and/or application of contemporary scientific research. These nine were considered serious contenders for their parties' nominations in late

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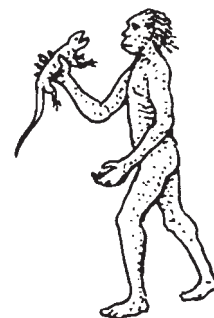
December — although early results from Iowa and New Hampshire seem to have narrowed the fields even more.

The summary began with a report from Jeffery Mervis describing the way in which the information was collected. In most cases, the summaries were prepared based on the comments made by candidates on the campaign trail and by their political advisors. Mervis also wrote that some of the information came from “colleagues, friends and foes alike, who are familiar with their careers (Mervis 2008: 22). The description of the candidates' positions were listed in alphabetical order by the last name of the candidate.

Two of the more intriguing entries were entitled “Other Republicans” and “Other Democrats”, but these contained only the names of seven candidates, three Republicans and four Democrats, without any information on their positions on science policy. By the time of publication, three of the Democratic candidates — Senators Joe Biden and Christopher Dodd, and former Senator Mike Gravel — had withdrawn from the race. Only Dennis Kucinich remained from this group. For the Republicans, there were no positions given for US Representatives Duncan Hunter and Ron Paul, nor for political commentator Alan Keyes.

Most of the candidates tended to be vague on the specifics of their approaches, but there were a few telling indicators. The leading Democratic contenders — Hillary Clinton, John Edwards, and Barack Obama — were positively inclined to increasing funding and placing responsibility for management of scientific research programs with members of the scientific community. Obama, in particular, was described as having an “evidence-based” approach to science-related issues (Bhattacharjee 2008: 28).

Elliott Marshall reported that the Guiliani campaign “successfully discouraged key advisors from speaking to *Science* about specific issues” (2008: 26). Jennifer Couzin reported that Mike Huckabee, despite his stated opposition to evolution, was generally positively



inclined toward medical and health sciences, as his actions as governor of Arkansas demonstrated.

In general, the articles avoided simply applying a one-dimensional analysis and describing candidates as either pro-science or anti-science. The individual pieces do a nice job of presenting the candidates' current statements on science issues and policies in the context of their previous statements and actions — in some cases giving a rationale for specific actions on legislation or policy.

The news item by Mervis is available on the journal's website for all readers, but access to the details of the candidates' positions requires a subscription. In many cases, local, regional, or state public libraries offer access for those with a local library card to publications like *Science* through their reference databases.

CANDIDATES' POSITIONS

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The Answers in Genesis Schism: No Resolution in Sight

Andrew J Petto

Jim Lippard reported in *RNCSE* at the end of 2006 on a split within the Answers in Genesis ministry that pitted the officials running the affiliate in the US against their counterparts in Australia, where the ministry began (Lippard 2006). Although Lippard reported several efforts between the two factions to negotiate a solution to various issues that divided them, it appears that those efforts have fallen apart yet again.

Creation Ministries International (CMI) — the name of the breakaway group in Australia — published an update on its website in early January 2008 (<<http://www.creationontheweb.com/content/view/5563/>>). The page — entitled “CMI-AiG: What's the dispute all about?” — details the history of the schism and CMI's complaints against AiG.

However, the most remarkable feature of this update is an index with links to documents on the web that lay out various details of the conflict, outcomes of various investigations and legal actions, and CMI's version of the current state of the dispute.

In contrast to the prominence that CMI has given to the dispute, it is difficult to find any mention of the disagreement on the Answers in Genesis web page. Searching for

“CMI” and “Creation Ministries International” at <<http://www.answersingenesis.org/>> returned no results. However, it is possible to get an overview of AiG's position on the conflict by reading through its History page (<<http://www.answersingenesis.org/about/history>>). This page lacks most of the details about the schism, saying only that there were no differences in doctrinal or scientific positions and that most of the disagreement was over management and operations. It is interesting that the AiG website lists the acronym “CMI” in its history page, but nowhere gives the full name of the Australian organization.

It is clear that this conflict will not be resolved soon, but it seems from the content of the web pages that CMI may be more affected by the split than is AiG. Except for the new details, the current state of the relationship between these two creationist organizations does not seem to have changed significantly over the past year.

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[Thanks to Jim Lippard for alerting us to the latest events in the ongoing dispute between AiG and CMI.]

THE GREAT TENNESSEE MONKEY PODCAST

A performance of the LA Theatre Works production *The Great Tennessee Monkey Trial* is now available on-line as a podcast. The play, written by Peter Goodchild and based on the transcripts of the Scopes trial in 1925, was originally broadcast by LATW in 1992; it was revived in 2005 to commemorate the eightieth anniversary of the trial. The podcast performance was recorded by WGBH at Harvard University's School of Government on April 9, 2007, and features Ed Asner as William Jennings Bryan and John de Lancie as Clarence Darrow. The complete performance time is about two hours. Reviewing the play in the *Wall Street Journal* (2005 Oct 1), the critic Terry Teachout commented, “the trial itself is heard as it happened, and is all the more dramatic for being true. ... while I doubt it'll change many minds in Harrisburg [where the trial in *Kitzmiller v Dover* was conducted], or anywhere else, it still makes for a thought-provoking show.” For the podcast, visit <http://www.wgbh.org/program-info?episode_id=3374968>.



2008 RELEASE OF SCIENCE, EVOLUTION, AND CREATIONISM

The National Academies Press has announced the release of *Science, Evolution, and Creationism*. The new publication extends the analysis and confirms the findings of the 1999 publication, *Science and Creationism: A View from The National Academy of Science*.

The NAP website describes the new book this way:

In the book *Science, Evolution, and Creationism*, a group of experts assembled by the National Academy of Sciences and the Institute of Medicine explain the fundamental methods of science, document the overwhelming evidence in support of biological evolution, and evaluate the alternative perspectives offered by advocates of various kinds of creationism, including "intelligent design." The book explores the many fascinating inquiries being pursued that put the science of evolution to work in preventing and treating human disease, developing new

agricultural products, and fostering industrial innovations. The book also presents the scientific and legal reasons for not teaching creationist ideas in public school science classes.

Mindful of school board battles and recent court decisions, *Science, Evolution, and Creationism* shows that science and religion should be viewed as different ways of understanding the world rather than as frameworks that are in conflict with each other and that the evidence for evolution can be fully compatible with religious faith. For educators, students, teachers, community leaders, legislators, policy makers, and parents who seek to understand the basis of evolutionary science, this publication will be an essential resource.

Visit http://www.nap.edu/catalog.php?record_id=11876 for further details on contents, authors, and ordering options.



CALL FOR PAPERS

Special Journal Issue of *Science & Education* **DARWINIAN ANNIVERSARY YEAR, 2009**

The year 2009 is a double anniversary: 200 years since Darwin was born (February 12, 1809) and 150 years since the publication of *On the Origin of Species* (November 24, 1859). To celebrate this anniversary, a special issue of *Science & Education* will be published.

Researchers working on areas related to Darwinism and evolution education are invited to contribute to this special issue. Conceptual, theoretical, empirical, and position-based manuscripts are welcome. Examples of topics may include (but are not limited to) the following:

- Darwinism in the history and philosophy of science
- Darwin's methodology and theorizing
- Historical treatments of the *Origin*
- Darwinism and politics
- Darwinism and religion
- Current status of evolutionary theory
- Public understanding and acceptance or rejection of evolution, especially in non-Western cultures
- Evolutionary explanations
- Evolution and teleology
- Empirical research in evolution education
- Evolution and the nature of science
- Creationism and "intelligent design"
- Cognitive barriers in understanding evolution
- Rationales and strategies for teaching evolution when it is controversial

- The teaching of evolution in cultures where Darwinism is rejected
- Other appropriate topics

Submission Date: December 31, 2008

Anticipated Publication Date: November 2009

Manuscripts, with abstract, should be submitted for review directly via <http://www.editorialmanager.com/sced/>.

Notification of intention to submit and subject matter is appreciated as it assists coordination and planning of the issue. Questions and inquiries should be directed to either of the guest editors:

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UPDATES

California, Roseville: The defendants in *Caldwell v Roseville Joint Union High School District et alia* won a victory in court on September 7, 2007, when Judge Frank C Damrell Jr granted their motion for a summary judgment against the plaintiff, Larry Caldwell. In 2003 and 2004, Caldwell, a lawyer and parent in the Sacramento suburb of Roseville, California, sought to persuade the RJUHSD Board of Trustees to adopt his "Quality Science Education" Policy, which would have called for teaching "the scientific strengths and weaknesses" of evolution (see *RNCSE* 2004 Mar/Apr; 24 [2]: 14-7). In 2005, after his proposals were rejected, he filed a lengthy complaint in federal court against the district, a number of its employees, and two members of the board of education, alleging that his civil rights were violated during the controversy. Caldwell told the *Sacramento Bee* (2005 Jan 16), "You ought to be able to bring a proposal without being treated differently because they don't like what you're saying, or they don't like your religious beliefs." But school board president Jim Joiner, a named defendant in the case, told the *Bee* that Caldwell received plenty of attention from the board and the district, noting that his proposal was discussed at eight separate meetings. Caldwell's suit was publicized by the Discovery Institute, which issued a press release on his behalf and subsequently added him as a guest blogger to its blog, and also by a number of media sources on the religious right (see *RNCSE* 2004 Nov/Dec; 24 [6]: 15-20).

In his decision, Judge Damrell emphasized, "this case is *not* about how biology, including discussions of evolutionary theory, can or should be taught in public schools. ... Rather, this case is about whether Larry Caldwell was denied access to speak in various fora or participate in certain processes because of his actual or perceived religious beliefs."

Although Caldwell alleged that he was denied such access, in violation of his rights to free speech, due process, and equal production and of the Establishment Clause of the First Amendment, the court found otherwise. Typical of the judge's remarks was: "the court has found that plaintiff has failed to proffer evidence sufficient to demonstrate a triable issue of fact as to any of his constitutional claims based upon this alleged discrimination." The legal defeat in *Caldwell v Roseville Joint Union High School District* is not Caldwell's first; in 2006, he represented his wife Jeanne Caldwell in *Caldwell v Caldwell et alia*, in which she alleged that the Understanding Evolution website endorsed a number of religious doctrines, thereby violating the Establishment Clause of the First Amendment by favoring certain religious groups over others. In that case, the presiding judge ruled that the plaintiff failed to allege that she had federal taxpayer standing, failed to sufficiently allege state taxpayer standing, and failed to establish that she suffered a concrete "injury in fact," which sufficed to justify the defendants' motion for dismissal (see *RNCSE* 2006 Jan-Apr; 26 [1-2]: 4-11).

The *Sacramento Bee* (2007 Sep 13) reported that Caldwell had no comment on his latest legal defeat, referring the *Bee*'s reporter to Kevin Snider of the Pacific Justice Institute (which describes itself as "a non-profit 501(c)(3) legal defense organization specializing in the defense of religious freedom, parental rights, and other civil liberties"), who worked with Caldwell on the case. Snider was quoted as saying, "We're still studying the opinion and haven't made a decision about what we're going to do." He would not comment on whether or not they planned to appeal. For his part, James Ward, who represented the defendants, was pleased by the decision, commenting, "The facts clearly show that the school district bent over backwards and tried very hard to

provide Mr Caldwell with an opportunity to present his ... proposals in the various ways that were structured for parents to present ideas to the district." Jim Joiner said, "The board and the district gave him special treatment beyond what we would typically give anyone," adding, "I always felt confident that a court would reach that conclusion"; Jan Pinney, a board member who, like Joiner, was also a named defendant in the case, agreed, observing, "He had more time before the board than anybody has ever had in my 12 years on the board." Pinney also described the lawsuit as "sour grapes" on Caldwell's part and as a waste of time, remarking, "For two years all our energy was spent fighting this issue."

Florida: Although she was one of the three finalists for the job of Education Commissioner of Florida, Cheri Pierson Yecke was passed over for the job in favor of Eric Smith, senior vice president of the College Board. Yecke is currently K-12 Chancellor at the Florida Department of Education, a job for which she was recruited in 2005 by then-governor Jeb Bush. Before that, she was Commissioner of Education in Minnesota, where she was widely criticized for comments supporting creationism (see *RNCSE* 2003 May-Aug; 23 [3-4]: 5-10); in 2004, she was not confirmed, and thus immediately removed from office, by the state senate (see *RNCSE* 2004 Mar/Apr; 24 [2]: 14-7). Her history followed her to Florida, where, for example, the *Palm Beach Post* story (2005 Oct 9) about her beginning her job there emphasized her support for creationism.

Although Yecke was quoted in that story as wondering "why the Florida reporters are so obsessed with creationism," her own behavior fueled their interest. In June 2007, Wesley R Elsberry (then on leave from NCSE) received a communication from a company called ReputationDefender, requesting on Yecke's behalf that he remove from his personal blog a statement read-



ing, “Yecke had explained in her advance publicity for the hearings [in Minnesota in 2003] that schools could include the concept of ‘intelligent design’ in teaching how the world came to be.” Elsberry’s statement was based on a contemporary press report and was later confirmed by a contemporary broadcast (see <<http://austringer.net/wp/?p=626>> for details).

The *St Petersburg Times* (2007 Jun 27) then reported on Yecke’s attempt to revise the record of her comments, writing, “Florida’s No 2 education official is tangled in a cyber-tussle with a tiny Minnesota newspaper and a scientist who blogs about the politics of teaching evolution.” Yecke told the newspaper that her decision to hire ReputationDefenders was unrelated to her bid to become Education Commissioner: “When you’re a public figure, you have to try to manage fact from fiction,” she said. According to the *Times*, two of her likely rivals for the post never considered undertaking a similar project.

As the process of selecting a new Education Commissioner continued, Yecke’s support for creationism continued to arouse concern. After she became a finalist for the job, the *Palm Beach Post* (2007 Sep 18) editorially commented, “Cheri Pierson Yecke is the kind of candidate to avoid. ... [S]he lost her job as education commissioner in Minnesota, in part because of her willingness to let schools teach creationism as an alternative to evolution. That typifies the ideological bent of Gov Bush’s education department, which warped intended reforms.”

Illinois: A professor of biology at Olivet Nazarene University, Richard Colling, wanted to express his views about the compatibility of his religious faith with his scientific knowledge and accordingly wrote *Random Designer: Created from Chaos to Connect with the Creator* (Bourbonnais [IL]: Browning Press, 2004). But his views, especially about evolution, were not welcome, as *Newsweek*’s Sharon Begley (2007 Sep 17) reported:

Anger over his work had been building for two years.

When classes resumed in late August, things finally came to a head. Colling is prohibited from teaching the general biology class, a version of which he had taught since 1991, and college president John Bowling has banned professors from assigning his book [which was previously used in “at least one history class, an advanced biology course, and the general biology course”]. At least one local Nazarene church called for Colling to be fired and threatened to withhold financial support from the college. In a letter to Bowling, ministers in Caro [a town in Missouri] expressed “deep concern regarding the teaching of evolutionary theory as a scientifically proven fact,” calling it “a philosophy that is godless, contrary to scripture and scientifically unverifiable.”irate parents, pastors and others complained to Bowling, while a meeting between church leaders and Colling “led to some tension and misunderstanding,” Bowling said in a letter to trustees.

The local *Daily Journal* (2007 Sep 13) added that, although Colling and the university administration are trying to reconcile, Colling “is still stinging because, he says, the book was a true and honest expression of faith; and one he felt led by God to write. Moreover, he says there is room with the college’s mission and policies for such an alternative view — and that no real case has been made to date that his views are inconsistent with those or the teachings of the Church of the Nazarene.”

In a previous article about Colling for the *Wall Street Journal* (2004 Dec 3), Begley reported, “In his new book, *Random Designer*, he writes: ‘It pains me to suggest that my religious brothers are telling falsehoods’ when they say evolutionary theory is ‘in crisis’ and claim that there is widespread skepticism about it among scientists. ‘Such statements are blatantly untrue,’ he argues; ‘evolution has stood the test of time and considerable scrutiny.’”

Iowa, Creston: A community college instructor at Southwestern Community College in Creston, Iowa, claimed that he was fired for telling his students that the biblical story of Adam and Eve ought not to be taken literally, according to the *Des Moines Register* (2007 Sep 21). Steve Bitterman was teaching a course on Western civilization to students in Osceola over the Iowa Communications Network in which, he said, “I told them it [Genesis] was an extremely meaningful story, but you had to see it in a poetic, metaphoric or symbolic sense, that if you took it literally, that you were going to miss a whole lot of meaning there.” Some of the students took offense, and Bitterman was fired two days later. He commented, “I’m just a little bit shocked myself that a college in good standing would back up students who insist that people who have been through college and have a master’s degree, a couple actually, have to teach that there were such things as talking snakes or lose their job.” But college officials, though declining to comment on the specific reasons for his firing, asserted, “There was no action taken that violated the First Amendment.” Bitterman told the *Register*, “As a taxpayer, I’d like to know if a tax-supported public institution of higher learning has given veto power over what can and cannot be said in its classrooms to a fundamentalist religious group ... If it has ... then the taxpaying public of Iowa has a right to know. What’s next? Whales talk French at the bottom of the sea?” A subsequent report in the *Register* (2007 Sep 25) quoted several students as complaining that Bitterman was crude and offensive; one said, “I think he was trying to start a debate, but it came across as insulting and offended everybody.” Bitterman defended his teaching style, explaining, “I certainly take students’ viewpoints seriously in the sense that I encourage them to express it, and then I will challenge that viewpoint, regardless of what it is, to see how well they can back it up with reason and critical thought.”

National: One of the panelists on “The View” — a long-running daytime talk show on ABC —



bewildered both her audience and her colleagues on September 18, 2007, by declaring that she not only rejects evolution but also is uncertain whether the earth is flat or round. Sherri Shepherd, a comedian and actress who recently joined the show, responded to a line of questioning about her views on evolution by saying, "I'm going to disagree with you anyway because I don't believe in evolution, period. I just think for me — I'm not speaking for anybody else. I just have a faith that is in the Bible. It's in Hebrews 11:1. It says faith is the substance of things hoped for and the evidence of things not seen." Later, Whoopi Goldberg asked her, "Is the world flat?" She responded, "is the world flat? ... I don't know. ... I never thought about it, Whoopi. Is the world flat? I never thought about it." Her remarks prompted a flock of incredulous blog posts and comments in the entertainment news. Shepherd later told *The Tonight Show's* Jay Leno (2007 Sep 21) that she was rattled by the technicality of the question: "All I heard was, 'how many triglycerides does it take to take Pluto down to the Robitussin when it meets Nyquil on the earth's horizon?' ... That's what I heard 'cause I was nervous." *All Movie Guide* describes Shepherd as "an outspoken and committed, born-again Christian."

National: A dispute over anti-creationist videos posted to YouTube, a popular on-line video site, is resolved now, according to *Wired News* (2007 Sep 25). The atheist group Rational Response Squad (<<http://www.rationalresponders.com>>) had posted several videos to YouTube criticizing the claims of the flamboyant young-earth creationist Kent Hovind and his Creation Science Evangelism (CSE) ministry; these videos included footage from CSE's own videos. CSE filed a complaint with YouTube under the Digital Millennium Copyright Act, and YouTube removed the Rational Response Squad's videos from its website and suspended its account. The Rational Response Squad then argued that its use of CSE's videos constituted fair use, and eventually YouTube restored the videos and reinstated its account. Filing a spurious com-

plaint under the DMCA is illegal, and a spokesperson for the Rational Response Squad said that the group plans to take legal action against CSE, whose founder is currently serving a ten-year sentence in federal prison for tax offenses and obstruction of justice (see *RNCSE* 2006 Jul/Aug; 26 [4]: 12-3).

Europe: On October 4, 2007, the Council of Europe's Parliamentary Assembly approved a resolution urging its member governments to oppose the teaching of creationism as science. The resolution, entitled "The dangers of creationism in education," states, "Today creationist ideas are tending to find their way into Europe and their spread is affecting quite a few Council of Europe member states," observing, "The prime target of present-day creationists, most of whom are Christian or Muslim, is education. Creationists are bent on ensuring that their ideas are included in the school science syllabus. Creationism cannot, however, lay claim to being a scientific discipline." Included is "intelligent design," which is described as "the latest, more refined version of creationism" and "presented in a more subtle way."

It was the second time that such a resolution was introduced. A previous version of "The dangers of creationism in education" was produced in response to a proposal (dated October 4, 2006) that described creationism as having "no credibility among the scientific community" and expressed concern "at the possible negative consequences of the promotion of creationism through education". Although the Parliamentary Assembly was scheduled to vote on a corresponding draft resolution, the vote was cancelled on June 25, 2007, on the grounds that the report was "unbalanced" and that it was inappropriate for the Council to address the topic. The report was returned to the committee, which vowed to return the resolution to the Assembly's agenda (see *RNCSE* 2007 Jan-Apr; 27 [1-2]: 4-9).

The approved resolution recognizes the importance of evolutionary theory in the modern world — "Denying it could have serious consequences for the develop-

ment of our societies. Advances in medical research with the aim of effectively combating infectious diseases such as AIDS are impossible if every principle of evolution is denied. One cannot be fully aware of the risks involved in the significant decline in biodiversity and climate change if the mechanisms of evolution are not understood" — and accordingly concludes, "The teaching of all phenomena concerning evolution as a fundamental scientific theory is therefore crucial to the future of our societies and our democracies. For that reason it must occupy a central position in the curriculum, and especially in the science syllabus, as long as, like any other theory, it is able to stand up to thorough scientific scrutiny."

Acknowledging the religious roots of creationism, the resolution begins by emphasizing, "The aim of this report is not to question or to fight a belief ... The aim is to warn against certain tendencies to pass off a belief as science," and notes that religious leaders (including Pope Benedict XVI and his predecessor Pope John Paul II) have not endorsed creationism. But, the resolution continues, "The war on the theory of evolution and on its proponents most often originates in forms of religious extremism which are closely allied to extreme right-wing political movements ... The fact of the matter, and this has been exposed on several occasions, is that some advocates of strict creationism are out to replace democracy by theocracy."

The resolution ends by calling on the member states of the Council of Europe "to defend and promote scientific knowledge; strengthen the teaching of the foundations of science, its history, its epistemology and its methods alongside the teaching of objective scientific knowledge; to make science more comprehensible, more attractive and closer to the realities of the contemporary world; to firmly oppose the teaching of creationism as a scientific discipline on an equal footing with the theory of evolution and in general resist presentation of creationist ideas in any discipline other than religion; to promote the teaching of evolution as a fundamental scientific theory



in the school curriculum” (internal numbering omitted).

The Council of Europe, as a Reuters story (2007 Oct 4) on the adoption of the resolution explains, “oversees human rights standards in member states and enforces decisions of the European Court of Human Rights.” The story adds, “The resolution, which passed 48 votes to 25 with 3 abstentions, is not binding on the Council’s 47 member states but reflects widespread opposition among politicians to teaching creationism in science class.” A press release about the resolution, a report containing both the draft resolution (see sidebar, p 25) and a memorandum providing a lengthy background discussion and explanation of its provisions, a list of the votes on the resolution, and a video (in French) of a press conference about it, are available on the Council of Europe’s website (<<http://assembly.coe.int/>>).

Sweden: The Associated Press reported (2007 Oct 15) that the Swedish government is drafting rules that “would ban religious elements in subjects other than religion, such as biology”. According to Agence France Presse (2007 Oct 15), the rules would apply both to public schools and to independent schools, which also receive funding from the state, but not to private schools. Prompting the rules was a controversy over efforts of the Exclusive Brethren Christian Fellowship, which rejects evolution, to start its own independent religious school. According to the Associated Press, “There are 67 elementary schools and six high schools with a confessional orientation in Sweden, which is a highly secular country. Most of them are Christian. They are outside the public school system, but are governed by Sweden’s law on education.” But the law is not sufficiently clear about the influence of religious views on the curriculum. The education minister Jan Bjorklund was quoted by Reuters (2007 Oct 16) as saying, “This is naturally brought about by the fact that different viewpoints are being discussed, for instance about the creation of the world — one based on science and one on religious views.” And a spokesperson for the education

ministry told the Associated Press, “A student shouldn’t be able to pass a natural science test by answering that God created the world. We don’t think that’s OK,” Neuman said. The rules, which would require parliamentary approval, are expected to be introduced in 2009.

United Kingdom: The British government’s promised guidance on creationism for teachers seems to have arrived. A press release at Teachernet, run by the Department for Children, Schools, and Families, states that “Creationism and intelligent design are not part of the National Curriculum for science” and describes “intelligent design” as “a creationist belief” that “is sometimes erroneously advanced as scientific theory but has no underpinning scientific principles or explanations supporting it and it is not accepted by the international scientific community.” The press release adds that “there is scope for schools to discuss creationism as part of Religious Education — a component of the basic school curriculum — in developing pupils’ knowledge and understanding of Christianity and other religions.”

The press release and a corresponding document entitled “Guidance on the place of creationism and intelligent design in science lessons” (dated September 18, 2007; available on-line via <<http://www.teachernet.gov.uk/docbank/index.cfm?id=11890>>) were occasioned by a propaganda blitz in late 2006 on the part of a newly formed creationist organization calling itself “Truth in Science”, which sent packets of creationist teaching materials to the science heads of every secondary school in the United Kingdom. Subsequently the government issued a series of statements and disclaimers, including a June 21, 2007, statement from the Prime Minister’s Office affirming that creationism (including “intelligent design”) “should not be taught as science” and promising guidance for schools “in due course.” (For background, see *RNCSE* 2007 Jan-Apr; 27 [1-2]: 4-9.)

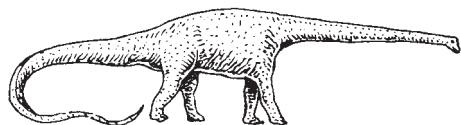
After explaining the place of science and religious education in the British national curriculum, “Guidance on the place of creationism and intelligent design in sci-

ence lessons” unequivocally states: “Creationism and intelligent design are sometimes claimed to be scientific theories. This is not the case as they have no underpinning scientific principles, or explanations, and are not accepted by the science community as a whole. Creationism and intelligent design therefore do not form part of the science National Curriculum programmes of study.” Presumably with Truth in Science’s materials in mind, it recommends, “Any resource should be checked carefully before it is used in the classroom. If resources which mention creationism or intelligent design are used, it must be made clear that neither constitutes a scientific theory.”

The guidance document explains that although it is inappropriate to teach creationism, it is not necessarily inappropriate to teach about creationism: “Any questions about creationism and intelligent design which arise in science lessons, for example as a result of media coverage, could provide the opportunity to explain or explore why they are not considered to be scientific theories and, in the right context, why evolution is considered to be a scientific theory. ... Science teachers can respond positively and educationally to questions and comments about creationism or intelligent design by questioning, using prompts such as ‘What makes a theory scientific?’, and by promoting knowledge and understanding of the scientific consensus around the theories of evolution and the Big Bang.”

It also refers to a Religious Education model unit entitled “How can we answer questions about creation and origins?” (available on-line at the Qualifications and Curriculum Authority website: <http://www.qca.org.uk/library/Assets/media/qca-06-2728_y9_science_religion_master.pdf>), which “aims to deepen pupils’ awareness of ultimate questions through argument, discussion, debate and reflection and enable them to learn from a variety of ideas of religious traditions and other world views.” When the unit debuted in January 2007, the *Guardian* (2007 Jan 23) commented, “The teaching of ID and





creationism should prove less contentious in this part of the curriculum (although the scientists who argue that ID is a science may be disconcerted), as pupils will investigate and role-play disputes between religion and science, such as Galileo, Charles Darwin and Richard Dawkins.”

The guidance document was welcomed by groups in the United Kingdom that support the integrity of science education. Simon Barrow, co-director of the Christian think-tank Ekklesia, welcomed the new guidelines as “an important step forward” in a September 26, 2007, press release, commenting, “Pupils seeking to acquire an understanding of religious and other life stances need to understand how and why fundamentalist world views emerge ... But they also need to know why they are rejected by mainstream theologians and scientists. Likewise, as the government rightly says, creationism and ID have no place in school science classrooms.”

Similarly, in a September 27, 2007, press release, Mike Brass, Chairman of the British Centre for Science Education, commented, “We are very pleased that the Government has issued such a strong statement and clear instructions to schools, which should go a long way to prevent children being misinformed,” adding, “However, we remain deeply concerned that creationist groups are still being allowed to operate or influence City Academies and similar schools outside the mainstream. The Government should close this loophole immediately.”

United Kingdom: The Association for Science Education — a professional association for teachers of science in Britain and around the world, with over 15 000 members — recently issued a statement (available online at <http://www.ase.org.uk/html/homepage/notes_news/oct2007/ScienceEduc_IntelliDesign_Creationism.pdf>) on science education, “intelligent design”, and creationism, reading in part:

Design has no grounds for sharing a platform as a scientific “theory”. It has no underpinning scientific principles or explanations to support it. Furthermore it is not accepted as a competing scientific theory by the international science community nor is it part of the science curriculum. It is not science at all. Intelligent Design belongs to a different domain and should not be presented to learners as a competing or alternative scientific idea. As such, Intelligent Design has no place in the science education of young people in school.

The statement also cautions against presenting “intelligent design” as a case study of a controversy in science, commenting, “Intelligent Design ... cannot be classed as science, not even bad or controversial science,” and recommends that “it should not be presented as an alternative scientific theory” if it is presented in religious education classes. The statement cites the Interacademy Panel’s statement on the teaching of evolution, to which the Royal Society of London and the National Academies of Science are signatories, as well as the recently issued guidance to British teachers on the place of creationism in the science classroom (see above).

United Kingdom, Lisburn: A local politician sought to convince the city council of Lisburn — a large town adjacent to Belfast — to send letters to secondary schools “encouraging them to teach alternative theories to evolution as the origins of the earth, such as Creation and Intelligent Design,” the *Lisburn Ulster Star* reported (2007 Sep 20). Paul Givan of the Democratic Unionist Party told the *Star*, “I have never believed in the theory of evolution and, like many people, believe in the teaching of creation. I believe science points to creation but our schools are teaching a very narrow remit and many exclude alternative theories to evolution. I have asked the Council to write to local schools encouraging them to give equality of treatment to other theories of the origins of life and how the earth came into existence.”

A number of Givan’s colleagues on the committee in which the proposal was presented were reluctant to interfere with curricula, however; Peter O’Hagan commented, “Were I the principal of a school and I got a letter like that from Lisburn City Council I would throw it in the bin.” A spokesperson from the Department of Education for Northern Ireland told the *Star*, “The revised curriculum offers scope for schools to explore alternative theories to evolution, which could include creationism, if they so wish. ... It is, however, a matter for individual schools, taking account of the needs and wishes of their pupils, parents and governors, to decide if they want to include the teaching of alternative theories.”

The council voted in favor of the resolution on September 25, 2007, according to the *Lisburn Ulster Star* (2007 Sep 26). “Givan[,] who made the original proposal[,] said he was not suggesting the council dictate what schools should or should not teach but simply pointing out that under the revised curriculum there was an opportunity for alternative theories to be taught,” the newspaper reported. Fellow members of the Democratic Unionist Party sided with Givan, including Edwin Poots, Northern Ireland’s Minister for Arts and Culture, “who made it plain he was a strong believer in biblical creation”; several reportedly described preventing the teaching of “alternatives” to evolution as a form of fascism.

The *Belfast Telegraph* (2007 Sep 27) editorially protested: “There are enough divisions in Northern Ireland society without more being invented — and given official credence. Religious fundamentalists have every right to state their beliefs, and argue their case for greater recognition, but when they try to impose them on the wider community, which clearly does not share their views and regards them as unfounded, they must be resisted at all costs. Attempts to introduce teaching creationism in public schools — not private — have consistently been rejected as contravening the separation of church and state. Most people, not just humanists, would agree.”

THE DANGERS OF CREATIONISM IN EDUCATION

DRAFT RESOLUTION – THE COUNCIL OF EUROPE’S PARLIAMENTARY ASSEMBLY

- 1 For some people the Creation, as a matter of religious belief, gives a meaning to life. Nevertheless, the Parliamentary Assembly is worried about the possible ill-effects of the spread of creationist ideas within our education systems and about the consequences for our democracies. If we are not careful, creationism could become a threat to human rights which are a key concern of the Council of Europe.
 - 2 Creationism, born of the denial of the evolution of species through natural selection, was for a long time an almost exclusively American phenomenon. Today creationist ideas are tending to find their way into Europe and their spread is affecting quite a few Council of Europe member states.
 - 3 The prime target of present-day creationists, most of whom are Christian or Muslim, is education. Creationists are bent on ensuring that their ideas are included in the school science syllabus. Creationism cannot, however, lay claim to being a scientific discipline.
 - 4 Creationists question the scientific character of certain items of knowledge and argue that the theory of evolution is only one interpretation among others. They accuse scientists of not providing enough evidence to establish the theory of evolution as scientifically valid. On the contrary, they defend their own statements as scientific. None of this stands up to objective analysis.
 - 5 We are witnessing a growth of modes of thought which, the better to impose religious dogma, are attacking the very core of the knowledge that we have patiently built up on nature, evolution, our origins and our place in the universe.
 - 6 There is a real risk of a serious confusion being introduced into our children’s minds between what has to do with convictions, beliefs, ideals of all sorts and what has to do with science, and of the advent of an “all things are equal” attitude, which may seem appealing and tolerant but is actually disastrous.
 - 7 Creationism has many contradictory aspects. The “intelligent design” idea, which is the latest, more refined version of creationism, does not deny a certain degree of evolution but claims that this is the work of a superior intelligence. Though more subtle in its presentation, the doctrine of intelligent design is no less dangerous.
 - 8 The Assembly has constantly insisted that science is of fundamental importance. Science has made possible considerable improvements in living and working conditions and is a not insignificant factor in economic, technological and social development. The theory of evolution has nothing to do with divine revelation but is built on facts.
 - 9 Creationism claims to be based on scientific rigour. In actual fact the methods employed by creationists are of three types: purely dogmatic assertions; distorted use of scientific quotations, sometimes illustrated with magnificent photographs; and backing from more or less well-known scientists, most of whom are not specialists in these matters. By these means creationists seek to appeal to non-specialists and sow doubt and confusion in their minds.
 - 10 Evolution is not simply a matter of the evolution of humans and of populations. Denying it could have serious consequences for the development of our societies. Advances in medical research with the aim of effectively combating infectious diseases such as AIDS are impossible if every principle of evolution is denied. One cannot be fully aware of the risks involved in the significant decline in biodiversity and climate change if the mechanisms of evolution are not understood.
 - 11 Our modern world is based on a long history, of which the development of science and technology forms an important part. However, the scientific approach is still not well understood and this is liable to encourage the development of all manner of fundamentalism and extremism. The total rejection of science is definitely one of the most serious threats to human rights and civic rights.
 - 12 The war on the theory of evolution and on its proponents most often originates in forms of religious extremism which are closely allied to extreme right-wing political movements. The creationist movements possess real political power. The fact of the matter, and this has been exposed on several occasions, is that some advocates of strict creationism are out to replace democracy by theocracy.
 - 13 All leading representatives of the main monotheistic religions have adopted a much more moderate attitude. Pope Benedict XVI, for example, as his predecessor Pope John-Paul II, today praises the role of the sciences in the evolution of humanity and recognises that the theory of evolution is “more than a hypothesis”.
 - 14 The teaching of all phenomena concerning evolution as a fundamental scientific theory is therefore crucial to the future of our societies and our democracies. For that reason it must occupy a central position in the curriculum, and especially in the science syllabus. Evolution is present everywhere, from medical overprescription of antibiotics that encourages the emergence of resistant bacteria to agricultural overuse of pesticides that causes insect mutations on which pesticides no longer have any effect.
 - 15 The Council of Europe has highlighted the importance of teaching about culture and religion. In the name of freedom of expression and individual belief, creationist ideas, as any other theological position, could possibly be presented as an addition to cultural and religious education, but they cannot claim scientific respectability.
 - 16 Science provides irreplaceable training in intellectual rigour. It seeks not to explain “why things are” but to understand how they work.
 - 17 Investigation of the creationists’ growing influence shows that the arguments between creationism and evolution go well beyond intellectual debate. If we are not careful, the values that are the very essence of the Council of Europe will be under direct threat from creationist fundamentalists. It is part of the role of the Council’s parliamentarians to react before it is too late.
 - 18 The Parliamentary Assembly therefore urges the member states, and especially their education authorities:
 - 18.1 to defend and promote scientific knowledge;
 - 18.2 strengthen the teaching of the foundations of science, its history, its epistemology and its methods alongside the teaching of objective scientific knowledge;
 - 18.3 to make science more comprehensible, more attractive and closer to the realities of the contemporary world;
 - 18.4 to firmly oppose the teaching of creationism as a scientific discipline on an equal footing with the theory of evolution and in general resist presentation of creationist ideas in any discipline other than religion;
 - 18.5 to promote the teaching of evolution as a fundamental scientific theory in the school curriculum.
 - 19 The Assembly welcomes the fact that 27 Academies of Science of Council of Europe member states signed, in June 2006, a declaration on the teaching of evolution and calls on academies of science that have not yet done so to sign the declaration.
- [See <<http://assembly.coe.int/Mainf.asp?link=/Documents/WorkingDocs/Doc07/EDOC11375.htm>> for the original, of which the present selection is section A.]

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!

Brian Alters is preparing to wow Canadian science students. According to a September 13, 2007, press release from McGill University, “The Imperial Oil Foundation has pledged \$800,000 to fund a five-year McGill University project designed to woo — and wow — elementary and high school students across the country. Led by Dr Brian Alters, Tomlinson Chair in Science Education and Sir William Dawson Scholar at McGill, the Winners of Wonderment (WOW) Lab will research and develop three-dimensional technologies to help teachers generate excitement, interest, inspiration and enhanced learning in mathematics and sciences. The Imperial Oil investment will help equip the new lab with audiovisual, computer and other equipment.” A member of NCSE’s board of directors, Alters is also the founder and director of McGill’s Evolution Education Research Centre.

After J Scott Turner of the State University of New York’s College of Environmental Science and Forestry published his op-ed “Why can’t we discuss intelligent design?” in the *Chronicle of Higher Education* (2007 Jan 19; 53 [20]: B20), identifying “intelligent design” as “the latest eruption of a longstanding strain of anti-Darwinist thought” and deploring the tendency on the part of academics to “scramble to the courts or the political ramparts to expel it from our classrooms and our students’ minds,” NCSE members were quick to respond. **David P Barash** of the University of Washington replied, “Intelligent design probably belongs in courses dealing with religion, public policy, contemporary history, and perhaps civics. It does not, however, belong in a science curriculum: Its

substance is religion, pure and simple, and that is what the fuss is about.” **Greg Laden** of the University of Minnesota answered, “The idea of an intelligent designer has time and again been rejected by science for good reason — based on the preponderance of evidence, combined with the power of well-tested theory — and for decades has resided only in the works of creationists, both overt and covert. So yes Mr Turner, the reaction to the idea of an intelligent designer is a ‘hue and cry.’ Why would you expect anything different?” And **Nick Matzke**, then still working for NCSE, explained, with reference to the *Kitzmiller v Dover* case, “Intelligent design is not an honest attempt to understand the natural world. It is not as if someone made a stunning new research finding, published it in a scientific journal, and proposed ID as the explanation. Instead, ID arose as a cynical attempt to come up with a newer, vaguer label for creationism.” All their letters appeared in the March 9, 2007, issue of the *Chronicle* (53 [27]: B13).

NCSE deputy director **Glenn Branch** was a major source for Liza Lentini’s article on creationism “One universe, under God” (*Discover* 2007 Oct; 74-8, 88-90), in which he explained the convenient vagueness of “intelligent design”: “First, by not taking a stand on issues that divide creationists, the intelligent design movement hopes to maintain a big tent under which creationists of all stripes are welcome to shelter. Second, by not identifying the designer as God, the intelligent design movement sought to immunize the position from constitutional scrutiny: The idea was to purge creationism of its overt religiosity, so that intelligent design could succeed where creation science failed.” Branch also commented on the support that “intelligent design” garners from young-earth creationists, saying, “their thinking, presumably, was that getting intel-

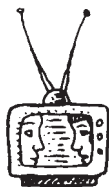
ligent design in the public schools would at least accomplish a lot of what they wanted if not all.” In the same issue, **Harry McDonald** (a former president of Kansas Citizens for Science) and **Charlotte McDonald** discussed the fights over evolution education in Kansas, which Harry described as “a symptom of a larger problem in our society ... Science is considered a tool to help convince people to adopt a certain political opinion.” Also of the same interest in the same issue of *Discover* is “Back to school,” in which **Wes McCoy**, a distinguished teacher at North Cobb High School in Kennesaw, Georgia, interviewed Margaret Spellings, the federal secretary of education (48-9).

C Mackenzie Brown recently published two articles on “avataric evolutionism” — “the idea that ancient myths of Vishnu’s ten incarnations anticipated Darwinian evolution” — namely, “The Western roots of avataric evolutionism in colonial India” (*Zygon* 2007; 42 [2]: 423-47) and “Colonial and post-colonial elaborations of avataric evolutionism” (*Zygon* 2007; 42 [3]: 715-47). In the latter, he concludes, “What distinguishes avataric evolutionists is the degree to which, on the one hand, they accept the ancient myths as more literal or more allegorical anticipations of Darwinism, and on the other, how qualified their acceptance of organic evolutionism actually is. ... It would seem that clarification of the many cultural, political, philosophical, and theological issues awaits precisely a resolution of the epistemological issues underlying avataric evolutionism. Only then can the many meanings of *science* (such as higher and lower, or material and spiritual) begin to be disentangled and the insights of the ancient Hindus appropriately contextualized.” Brown is Professor of Religion at Trinity University in San Antonio, Texas.

Rodger Bybee, executive director emeritus of Biological Sciences Curriculum Study, contributed a

How to Talk to the TV Media

Martha Heil



Most people get their news and information about science and technology from TV news, and 44% rely on local TV news as their primary source of news and information.

This means we need to turn to TV news outlets *first* when we have news.

TV stories are:

- Shorter (usually about 45 seconds);
- More likely to include “balance”;
- Less likely to include an explanation of the science;
- Heavily reliant on visuals; and
- More comfortable with anecdotes than data.

The *first* rule of journalism is to get the story fast; the *second* rule is to get it right. Journalists are in intense rivalry with their competitors for breaking news, and in order to get their story in first, they will favor speed over detail.

Your job in this situation is to respond promptly to the media call; this will help ensure that your message is included and accurate information is provided. And a quick response is more likely to make it into the story. Do not worry that the information you have is not absolutely 100% verified and accurate — usually reporters will ask questions that deal with the very basic principles of the situation or of the science. *You know much more than they do* on the topic they are about to put on the air.

TV reporters are often heavily “multitasking” with their story assignments. They may come to you from a completely different situation (such as from a fire or from the police department covering an unrelated story); they are likely to be boning up on your interview as they drive across town. You can easily turn this to your advantage if you have a clear explanation for them why they are here to interview you (“I’m a parent of a child in Dover Senior High School, and I am outraged that my child is being taught that ‘intelligent design’ is an acceptable alternative to real science.”)

A TV crew usually consists of a camera person, a sound specialist, and a producer. TV crews for longer-format shows and interviews may also include coordinators, hosts, or assistant producers. The local TV crew will most likely be coming to you with standard questions (the who, what, where, when, and why of the story) and if you have more to say, you have the opportunity to say it. The best journalists ask at the end of an interview, “Is there anything else I should be asking you about?” This is the time to restate and re-emphasize your message — even if you’ve said it before. If the interview is wrapping up, and the journalist hasn’t asked that question, you should say, “There’s something I really want you to understand,” and then get your message out — even if you’ve said it before.

There’s a saying in the media: the medium drives the message. This means that for TV, the visuals are the most important. The best-honed statement is not as powerful as the shot of the consequences in action. Think beforehand as the crew comes to your location about how you want to *show*, not just *tell*, your message. Props like books, documents, or pictures can be powerful. Locations like classrooms, school board offices, and

churches carry powerful messages about the meaning of the statements you’re about to make. A picture, as they say, is worth a thousand words.

The project manager or senior scientist or president of the citizens for science group is not always the best speaker for TV on the topic, even though he or she may be the best writer of op-eds or the best organizer. You know the most enthusiastic person on your team or in the group: the one with elementary school age children, the one who never stops talking about your subject? That’s the one to put in front of the TV cameras (After he or she has been prepared with your group’s best talking points, of course).

How do you keep your intellectual honesty and say what journalists need? Well, when they say, they’re looking for a story, they’re not kidding. They want a narrative. They want to show the event in a dramatic way. If you’re a scientist, your tendency may be to follow the main trend, not to look for dramatic anecdotes that seem to you unrepresentative of the situation. But there is a way to help the journalist to complete the story: think of a typical example — a parent, a teacher, a student, and then bring that person forward as part of your interview. (“My daughter will be going to this high school next year, and I don’t want her science education to be incomplete.”)

KEEP THE INTERVIEW SIMPLE

You are not bound by oath, you are not at an oral thesis exam, and you’re not giving a talk to your colleagues at a meeting. You are speaking to a reporter, and through her, to the public. Most adults in the US have only high-school knowledge of science and science-related topics. Anything technical that you feel you *must* say, you must say *simply*. In fact, if a reporter does not hear a simple explanation, he may assume you don’t know enough about the topic to be speaking on it. Pretend you’re explaining to a very interested, bright, ten-year-old.

On points of civic discussion, you should keep things equally simple. Your statements about the problems in your community, on your school board or with science classes, should be just as simple as when you’re discussing them with your neighbors. Be conversational and use short sentences.

So, to make a successful TV story:

Use a representative party; for example, a parent from the school system who is unhappy with the policy just passed.

Prepare a short (20-word) explanation of the main point that the reporter should know; for instance, “The policy would hurt our children’s schooling because it allows teachers to teach religion in public schools, which is illegal.”

Use slogans and “sound bites”. Every word counts. Think of the mission of your organization. Think of the simplest phrases you have heard and even jokingly simple ways to sum up the situation.

Use your hands when you talk, and animate your face to carry the message you’re conveying. The camera will frame you from just below the shoulders up, so be sure to raise your hands above waist level when using them.

In broadcast situations, assume that everything is being recorded. Don’t say anything you wouldn’t want to hear later on TV.

Martha Heil has worked as a media relations specialist for the past seven years at NASA’s Jet Propulsion Laboratory and at the American Institute of Physics.

TEACHING AND LEARNING ABOUT EVOLUTION

"We are not blessed with absolute certainty about any fact of nature, but evolution is as well confirmed as anything we know — surely as well as the earth's shape and position (and we don't require equal time for flat-earthers and those who believe that our planet resides at the center of the universe). We have oodles to learn about how evolution happened, but we have adequate proof that living forms are connected by bonds of genealogical descent," Stephen Jay Gould once wrote. For help in appreciating and explaining the evidence for evolution, and the nature of the scientific enterprise of which evolutionary theory is a vital part, NCSE recommends the following books, all of which are now available through the NCSE website: <<http://www.ncseweb.org/bookstore.asp>> — look in the "In the latest *RNCSE*" section. And remember, every purchase through the web site benefits NCSE!



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

EVOLUTION FOR TYROS

Darwin and Evolution for Kids
by Kristin Lawson

In *Darwin and Evolution for Kids*, Lawson provides a biography of Darwin combined with a sketch of his ideas and their development, along with "engaging and fun activities where children can: make their own fossils using clay, seashells, and plaster; keep field notes as backyard naturalists; investigate whether acquired traits are passed along to future generations; explore the adaptive strategies plants have developed to distribute seeds; observe how carnivorous plants trap and devour their prey; go on a botanical treasure hunt." *Darwin and Evolution for Kids* was selected by National Public Radio's Science Friday as one of the best science books of 2003. For ages 9 and up.

Science, Evolution, and Creationism

from the National Academy of Sciences and the Institute of Medicine

Designed to give the public a comprehensive and up-to-date picture of the current scientific understanding of evolution and its importance in the science classroom, *Science, Evolution, and Creationism* is twice as long as the second edition (published in 1999 as *Science and*

Creationism), and teems with new examples of the predictive power and practical importance of evolution. Addressing creationism in its various forms, it concludes, "No scientific evidence supports these viewpoints," and insists, "Given the importance of science in all aspects of modern life, the science curriculum should not be undermined with nonscientific material."

The Top 10 Myths About Evolution

Cameron M Smith and Charles Sullivan

From the publisher: "In this concise, accessible, 'myth-buster's handbook,' educators Cameron M Smith and Charles Sullivan clearly dispel the ten most common myths about evolution, which continue to mislead average Americans. Using a refreshing, jargon-free style, they set the record straight on claims that evolution is 'just a theory,' that Darwinian explanations of life undercut morality, that Intelligent Design is a legitimate alternative to conventional science, that humans come from chimpanzees, and six other popular but erroneous notions. Smith and Sullivan's reader-friendly, solidly researched text will serve as an important tool, both for teachers and laypersons seeking accurate information about evolution."

Evolution 101

by Randy Moore and Janice Moore
Randy Moore and Janice Moore's *Evolution 101* aims, in the words of its publisher, to provide "readers — whether students new to the field or just interested members of the lay public — with the essential ideas of evolution using a minimum of jargon and mathematics." It succeeds marvelously. The reviewer for NSTA Recommends writes, "Seldom is a book so well written and so well researched that it ought to be required reading for every thinking person," adding, "Not only should every high school, community, and university library have a copy of *Evolution 101* but every science teacher in the country should as well."

TEACHING EVOLUTION

Teaching Biological Evolution in Higher Education:

Methodological, Religious, and Nonreligious Issues

by Brian Alters

Reviewing *Teaching Biological Evolution in Higher Education* for the *McGill Journal of Education*, NCSE's deputy director Glenn Branch described the book as "a splendid vade mecum," adding, "Alters provides a wealth of valuable suggestions for teaching evolution effectively at the college level, with

sensible advice for understanding the misconceptions that students are likely to bring to class. ...Whether creationists are increasingly present or only increasingly visible ... they are definitely on campus, and *Teaching Biological Evolution in Higher Education* should be on the shelf of any instructor who teaches any aspect of evolution at the college level."

Defending Evolution in the Classroom

by Brian J Alters and
Sandra M Alters

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

Evolution in Perspective: The Science Teacher's Compendium

edited by Rodger W Bybee
From the publisher, the National Science Teachers Association: "If ever a subject could benefit from a strong dose of perspective, it's evolution. This important new book supplies the necessary insights by bringing together the views of leading scientists, professors, and teachers. Working from the premise that only those students whose schools teach them about the nature of science will truly understand evolution, the collection gathers 12 influential articles first published in the NSTA member journal, *The Science Teacher*. ... This collection comes from, and is developed for, the people on the front lines — educators who deal with the controversy."

Investigating Evolutionary Biology in the Laboratory
edited by William F McComas
In *Investigating Evolutionary Biology in the Laboratory*, William F McComas assembles a host of useful articles that together provide a complete introduction to the strategies and rationales for teaching evolutionary biology in the laboratory, including experiments and exercises. Topics include Foundations of Evolution Education, Examining the Evidence for Evolution, Using the Tools and Principles of Evolution, Variation and Adaptations within Species, Biotic Potential and Survival, Simulating Natural Selection, and The New Evolutionary Synthesis. A long-time member of NCSE, McComas was awarded the Evolution Education Award for 2007 by the National Association of Biology Teachers.

EVOLUTION AND THE NATURE OF SCIENCE

Science As a Way of Knowing: The Foundations of Modern Biology

by John A Moore

From the publisher: "For the past twenty-five years John Moore has taught biology instructors how to teach biology — by emphasizing the questions people have asked about life through the ages and the ways natural philosophers and scientists have sought the answers. This book makes Moore's uncommon wisdom available to students in a lively and richly illustrated account of the history and workings of life. Employing a breadth of rhetoric strategies — including vividly written case histories, hypotheses and deductions, and chronological narrative — *Science as a Way of Knowing* provides not only a cultural history of biology but also a splendid introduction to the procedures and values of science."

Teaching About Evolution and the Nature of Science
from the National Academies of Science

Published in 1998 under the auspices of the National Academies of Science, which provides authoritative scientific advice to the federal government, *Teaching About Evolution and the Nature of Science* is addressed to "the teach-

ers, other educators, and policy makers who design, deliver, and oversee classroom instruction in biology. It summarizes the overwhelming observational evidence for evolution and suggests effective ways of teaching the subject. It explains the nature of science and describes how science differs from other human endeavors. It provides answers to frequently asked questions about evolution and the nature of science and offers guidance on how to analyze and select teaching materials."

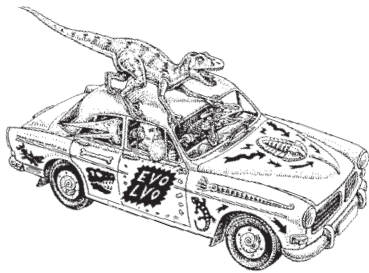
The Nature of Science and the Study of Biological Evolution
from NSTA and BSCS

The Nature of Science and the Study of Biological Evolution, as its title indicates, adroitly interleaves a discussion of the nature of science with a broad perspective on evolution. Consisting of a text for high school students and a CD-ROM for teachers, the material discusses the nature and methods of science, the development of the theory of evolution, seven lines of evidence that converge on evolution, population genetics, natural selection, and primate and human evolution. Both the text and the CD-ROM are imbued with the pedagogical acumen characteristic of the National Science Teachers Association and the Biological Sciences Curriculum Study.

The Creation Controversy & the Science Classroom

by James W Skehan and
Craig E Nelson

Consisting of two sections, "Modern Science and the Book of Genesis" by James Skehan and "Effective Strategies for Teaching Evolution and Other Controversial Topics" by Craig Nelson, *The Creation Controversy & the Science Classroom* aims to provide teachers with an understanding of the nature of science and the relationship between science and religion. Brian Alters described Skehan's contribution as "a concise, detail-rich history of some of the relevant issues concerning science and biblical scholarship, with a good relevant criticism of creationism woven throughout," and Nelson's as "to the point, with a great number of useful ideas and strategies packed in a short read."



NCSE on the Road

A CALENDAR OF SPECIAL EVENTS, PRESENTATIONS, AND LECTURES

DATE April 17, 2008
CITY Madison WI
PRESENTER Eugenie C Scott
TITLE Evolution: The Science Teacher's Dilemma
EVENT 7th Annual International Bioethics Forum
TIME 1:15 PM
LOCATION BioPharmaceutical Technology Center
CONTACT Karin Borgh, karin.borgh@btci.org

DATE May 2, 2008
CITY New York NY
PRESENTER Eugenie C Scott
TITLE [Panel discussion]
EVENT Evolution: From the Beginning to Humans
TIME TBA
LOCATION Rockefeller University
CONTACT James E Darnell Jr, darnell@rockefeller.edu

DATE September 16, 2008
CITY Boone NC
PRESENTER Eugenie C Scott
TITLE Why Darwin Matters
EVENT Public lecture in Darwin series
TIME 7:00 PM
LOCATION Appalachian State University
CONTACT Howie Neufeld, neufeldhs@appstate.edu

NCSE SPEAKERS AVAILABLE

NAME Eugenie C. Scott
TITLE NCSE Executive Director
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guest editorial to *The American Biology Teacher* (2007 Oct; 69 [8]: 454-7) on the 50th anniversary of Sputnik. The Soviet Union's launch of the first artificial satellite in 1957 stimulated a national reform of science education, including the founding in 1958 of BSCS. "The United States must again reform science education," Bybee wrote, "in this case because we are losing our competitive edge in the global economy and must clearly attend to environmental and resource issues because they often underlie economic realities." Of interest in the same issue of *The American Biology Teacher* are **William D Stansfield's** article "Fuzzy data sets" (458-9), suggesting that students be introduced to data sets involving subjective decisions in order to introduce them to the issues of their reliability; and Jennifer R Robbins and Pamela Roy's article "The natural selection: Identifying & correcting non-science student preconceptions through an inquiry-based, critical approach to evolution" (460-6).

NCSE Supporter **Sean B Carroll** was elected to the National Academy of Sciences, one of the highest honors in the world of science. According to a May 1, 2007, press release from the University of Wisconsin, Madison, "Carroll, an investigator in the Howard Hughes Medical Institute, has been a member of the UW-Madison faculty since 1987. He studies how genes and genetic regulation drive the development and evolution of diverse animal forms and has authored two popular science books on the topic. His work on fruit flies and other insects has revealed some of the key genetic players underlying major events in animal development, such as limb growth and coloration patterns." Also elected to the Academy in 2007 were NCSE members **John G Hildebrand**, Regents Professor and professor of neurobiology, biochemistry and molecular biophysics, entomology, and molecular and cellular biology, and director, Arizona Research Laboratories Division of Neurobiology, University of Arizona, Tucson, and **William E Moerner**, Harry S Mosher Professor of Chemistry, Stanford University.

William A Clemens was presented with the Fellows' Medal of the California Academy of Sciences on November 9, 2007. The Academy's highest honor "is given to especially prominent scientists who have been recognized for their outstanding contributions to their specific field(s) of science." Clemens is Professor Emeritus in the Department of Integrative Biology at the University of California, Berkeley.

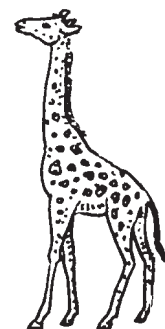
Taner Edis contributed "Intelligent design: A blind alley" to Islam Online (available on-line via <<http://tinyurl.com/2cygfg>>) as part of a symposium on evolution and Islam; also contributing were Peyton West of the AAAS, Mustafa Akyol (a Turkish journalist with ties to the Discovery Institute), and the pseudonymous Islamic creationist Harun Yahya. "Although I am not religious," Edis wrote, "I was born and raised in Turkey, and I continue to be concerned about how the Muslim world is a disaster zone for modern science." With regard to "intelligent design" in particular, he concludes, "Where natural science is concerned, the Muslim world really is a disaster area. Many Muslims are worried about this state of affairs, regardless of whether they are devout or secular in outlook — they correctly perceive that Western accomplishments in science and technology are a key to unwelcome Western military and economic domination of Muslim lands. If the Muslim world is to improve its scientific prospects, can Muslims afford to indulge in ideas like the popular creationism of Harun Yahya? Is it really a good idea to go down a scientific blind alley such as ID?" Edis, who teaches physics at Truman State University, is RNCSE's associate editor for physics and astronomy, and the author of *An Illusion of Harmony: Science and Religion in Islam* (Amherst [NY]: Prometheus Books, 2007).

No fewer than three members of NCSE were among the recipients of 2007's State Professors of the Year Award, bestowed by the Council for Advancement and Support of Education and the Carnegie Foundation for the Advancement of Teaching:

Andrew Fraknoi, Professor of Astronomy at Foothill College; **John M Lynch**, Honors Faculty Fellow at Arizona State University; and **Dawn J Wright**, Professor of Geography and Oceanography at Oregon State University. According to the award's website, "winners are chosen on the basis of their extraordinary dedication to undergraduate teaching, determined by excellence in the following four areas: impact on and involvement with undergraduate students; scholarly approach to teaching and learning; contributions to undergraduate education in the institution, community and profession; and support from colleagues and current and former undergraduate students." Congratulations to all three!

Reviewing Michael Behe's latest book, *The Edge of Evolution* (New York: Free Press, 2007), in the October 2007 issue of *The New Criterion* (available on-line at <http://www.creationismstojanhorse.com/Gross_Behe_Review_10.2007.pdf>), the biologist **Paul R Gross** was anything but impressed. After observing that Behe's argument from irreducible complexity in *Darwin's Black Box* (New York: Free Press, 1996) was quickly recognized to fail, he commented, "In response, Behe and the ['intelligent design'] movement shifted ground, first redefining IC in an effort to meet the flood of negation, finally (in effect) by scanting it in favor of more general claims. The Edge of Evolution is Behe's heroic effort to snatch victory from the jaws of defeat." Gross added, "The clear goal is to justify his original claim that the purposeful complexity of life cannot be a product of 'random mutation,' that there must be intelligent design, and (en passant) that ID is the great scientific discovery of our age."

Noting that Behe's arguments have already taken a pounding (see RNCSE 2007 May-Aug; 27 [3-4]: 11-14 for descriptions of reviews of **Sean B Carroll**, **Jerry Coyne**, **Kenneth R Miller**, and **Michael Ruse**; RNCSE 2007 Jan-Apr; 27 [1-2]: 38-40 for a review by **David E Levin**, and *The New York Times* Sunday Book Review [2007 Jul 1] for a no-holds-barred review by Richard Dawkins), Gross identified



two kinds of scientific flaws: “errors of the model itself and in the associated calculations, and ... ignoring important conflicting material in the primary literature.” He gave three examples: Behe’s misunderstanding of a report on the frequency of the malaria parasite’s development of spontaneous resistance to a drug; his unwarranted assumption that mutations in the relevant gene would have to be simultaneous; and his neglect of the experimental and theoretical literature on protein evolution — “the book’s grand argument ignores the known, frequent appearance, by Darwinian pathways, of protein-protein interactions in small populations. There is a vast experimental and theoretical literature on protein evolution.”

Paul R Gross is University Professor of Life Sciences, emeritus, at the University of Virginia, and holds honorary degrees from the Medical College of Ohio and Brown University. He is a Fellow of the American Academy of Arts and Sciences. With Norman Levitt, he authored *Higher Superstition: The Academic Left and Its Quarrels with Science* (Baltimore: Johns

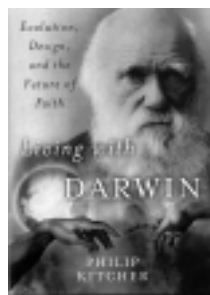


Paul R Gross

Hopkins University Press, 1994); with **Nick Matzke**, he wrote “Analyzing Critical Analysis: The Fall Back Anti-evolutionist Strategy” for *Not in Our Classrooms: Why Intelligent Design is Wrong for Our Schools* (Boston: Beacon Press, 2006); and with **Barbara Forrest**, he authored *Creationism’s Trojan Horse: The Wedge of Intelligent Design* (New York: Oxford University Press, 2004; reissued in paperback with a new chapter on *Kitzmiller v Dover*, 2007).

Philip Kitcher’s latest book, *Living with Darwin: Evolution, Design, and the Future of Faith* (New York: Oxford University Press, 2006), received a favorable review from James Krueger in *Notre Dame Philosophical Reviews* (2007 Aug 14; available on-line at <<http://ndpr.nd.edu/>

[review.cfm?id=10743](http://ndpr.nd.edu/review.cfm?id=10743)>). Krueger wrote, “Philip Kitcher again takes up the task of defending evolutionary theory from creationist challenges. In this short, accessible



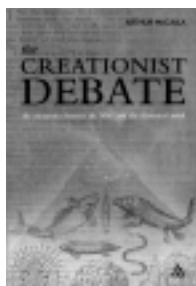
work, he not only hopes to offer such a defense, he also aims to situate religiously motivated objections to evolution within the context of the history of encounters between defenders of evolution and religious believers. The hope is to gain some sense of what the sources of the ongoing controversy are so that we might understand why the debate appears interminable. Overall, the book’s historical bent makes it a useful introduction to the topic, and it could help to move conversations about creationism in a more constructive direction, though perhaps not in the way Kitcher intends.” A supporter of NCSE, Kitcher is the John Dewey Professor of Philosophy at Columbia University. He is the author of many books, including the classic critique of young-earth creationism, *Abusing Science: The Case Against Creationism* (Cambridge [MA]: MIT Press, 1982).

The *Orange County Register* (2007 Oct 7) featured a story about **James Hofmann** and his creationism/evolution class at California State University, Fullerton. “Showing — not telling — is the point of ‘Evolution and Creation,’ Hofmann’s long-running seminar on one of science’s hairiest debates: evolution vs ‘intelligent design.’ The first theory — which says that all life evolved from a common ancestor — is the scientific equivalent of the Magna Carta, a guiding principle that undergirds mainstream debate about the origins of man. The second theory, advanced by Christian academics and advocates, argues that life appears to have a purpose for which an intelligent creator — God — is the only possible explanation,” the *Register* wrote. “Hofmann makes no bones about where he falls. ‘Intelligent design is a very good PR movement but not

much else,’ he says.” NCSE deputy director **Glenn Branch** suggested that creationism survives because of its appeal to fairness, saying, “Americans love fairness ... The idea [by creationists] is that you appeal to these attitudes of openness and fairness, but you do this in the service of a very narrow religious viewpoint that doesn’t have any scientific evidence backing it up.” “I’ve been accused on the one hand of overselling creationism,” Hofmann told the newspaper, “and on the other hand of [being too critical]. That tells me I’m being fairly even-handed.” Yet the effect of the class is to debunk creationism, he added. “It can’t help but do that. ... Evolution science is pretty overwhelming.”

NCSE supporter **Lynn Margulis** produced two books recently. The first, *Mind, Life, and Universe: Conversations with Great Scientists of our Time* (White River Junction [VT]: Chelsea Green, 2007), which she co-edited with Eduardo Punset, consists of interviews with various scientists, including Edward O Wilson, **Daniel Dennett**, Sydney Brenner, the late **Stephen Jay Gould**, Richard Dawkins, and Sheldon Lee Glashow. David Baltimore comments, “It is wonderful to hear these scientists respond in their own voices to such interesting questions. A book full of nuggets of wisdom.” The second, *Dazzle Gradually: Reflections on the Nature of Nature* (White River Junction [VT]: Chelsea Green, 2007), which she co-authored with her son Dorion Sagan, consists of a series of essays by one or both of them. In his foreword, Roald Hoffmann comments, “In *Dazzle Gradually* we have one of the great iconoclastic biologists of our time, and her son, both excellent writers, firing ideas at us, reflecting, asking questions, making connections. ‘Truth’s superb surprise’ is their gift to us.” Margulis is Distinguished University Professor in the Department of Geosciences at the University of Massachusetts, Amherst.

Arthur McCalla contributed “Creationism” to *Religion Compass*, a new journal that “guides students, researchers and non-specialist scholars through the



accumulating body of literature, and navigates the field by laying out the territory, describing divisions and subdivisions of Religious Studies and

identifying the major issues within those sections" (2007; 1 [5]: 547–60). In the abstract, he writes, "Creationist opposition to modern evolutionary and geological sciences derives from the attempt of American Protestant fundamentalists to protect the inerrancy of the Bible from the challenges of any and all historical sciences. Creation science is not an independent investigation of the natural world, but rather biblical testimony. Intelligent design, the latest variant of creationism, is better understood as a legal strategy rather than as genuine science. The creation–evolution controversy is at bottom a conflict over the status and authority of the Bible in the modern world. The Creationism with which this article is concerned is the antihistorical ideology associated with American Protestant fundamentalism." McCalla is Associate Professor in the Department of Philosophy/Religious Studies at Mount Saint Vincent University and the author of *The Creationist Debate* (London: Continuum, 2006), reviewed in *RNCSE* 2007 Jan–Apr; 27 [1–2]: 42–3.

NCSE Supporter **Kenneth R. Miller** was interviewed in the *Brown Daily Herald* (2007 Sep 19) under the rubric of "science's media darling." Prominently featured, of course, was his role in *Kitzmiller v Dover*, in which he testified for the plaintiffs: "One of the things that happened was that the scientific case — if there ever was one — for this thing called 'intelligent design' just collapsed, literally fell apart. It also became clear that intelligent design is just a re-labeling of what used to be called 'creationism' or 'creation science.'" The interview ended with his bemused take on the aftermath of his appearance on the satirical cable television show "The Colbert Report" (2006 Jan 12; available on-

line at <<http://www.millerandlevine.com/talks/colbert.html>>): "nothing I've ever done in my whole scientific career has gained me as much credibility among my students as appearing on 'The Colbert Report.' There's no question that one of the reasons I've literally been flooded with lecture and seminar invitations all over the country is because people have seen the segment or heard about it and thought, 'Here's somebody who can go nose-to-nose with Stephen Colbert.' My phone hasn't stopped ringing." Miller teaches biology at Brown University.

Randy Moore and his colleagues Murray Jensen, Jay Hatch,



Randy Moore

and Leon Hsu published "A scoring rubric for students' responses to simple evolution questions: Darwinian components

in *The American Biology Teacher* 2007 Sep; 69 (7): 394–9, in which they present "a scoring rubric that will help teachers evaluate students' understanding of biological evolution." Dividing evolution into four components — variation, genetics, differential survival and reproduction, and change over time — they discuss the rubric and its utility, with a host of examples showing how student answers were scored. "Teaching students the four components of Darwin's theory is an easy and logical introduction to a unit of evolution," they conclude, "but it is important that students can use the rubric to solve novel evolution problems, and not simply recite the key phrases for the four components." Moore, a former editor of *The American Biology Teacher*, teaches biology at the University of Minnesota. Of interest in the same issue is Todd Decker, **Gerald Summers**, and Lloyd Barrow's "The treatment of geological time and the history of life on earth in high school biology textbooks" (401–5), which compares the treatment of geological time and biological events within it in eleven widely used high school text-

books. There is room for improvement, they report: "An accurate view of the geological time scale will enable biology teachers to reduce the number of misconceptions concerning the history of life on earth." Summers teaches biology at the University of Missouri.

Kevin Padian, the president of NCSE's board of directors, was elected as a Fellow of the American Association for the Advancement of Science in October 2007 "for distinguished contributions to the study of the vertebrate evolutionary adaptations and especially for his leadership in science education," according to an October 26, 2007, press release from the University of California, Berkeley. Padian is Professor of Integrative Biology at the University of California, Berkeley, and Curator at the University of California Museum of Paleontology. He testified for the plaintiffs in *Kitzmiller v Dover*, the 2005 case in which teaching "intelligent design" in the public schools was found to be unconstitutional, and the transcript of his testimony, together with the slides he used, is available on NCSE's website at <<http://www.sciohost.org/ncse/kvd/Padian/kpslides.html>>. Members of NCSE who were also elected Fellows of the AAAS in October 2007 include **Carl A Maida** of the University of California, Los Angeles; **Sally McBrearty** of the University of Connecticut; **Lawrence M Schell** of the University at Albany, State University of New York; **Sara Stinson** of the City University of New York, Queens College; **Linda D Wolfe** of East Carolina University; **J David Archibald** of San Diego State University; **Tom A Ranker** of the University of Colorado; **Randy W Schekman** of the University of California, Berkeley; **Andrew D Miranker** of Yale University; **Naomi Oreskes** of the University of California, San Diego; and **Adrian I Melott** of the University of Kansas. (Let NCSE know if we overlooked your name on AAAS's list!)

Robert T Pennock reviewed a pair of books for *American Scientist* (2007 Nov–Dec; 95: 528–31): George Levine's *Darwin Loves You* (Princeton [NJ]: Princeton University Press, 2006;



reviewed by Chet Raymo in *RNCSE* 2006 Nov/Dec; 26 (6): 45) and David Sloan Wilson's *Evolution for Everyone* (New York: Delacorte Press, 2007; reviewed by J José Bonner in *RNCSE* 2007 Jan-Apr; 27 (1-2): 36-7). Referring to *Darwin Loves You*, Pennock comments, "The book is erudite and wonderfully interdisciplinary." But he complained of two weaknesses: Levine's failure to present illuminating examples — "He might have profitably spent less time saying what he was going to do and more time actually doing it" — and his fretful self-consciousness, which produces a flurry of caveats that "risks obscuring important insights." *Evolution for Everyone*, on the other hand, "is chockablock with examples, data, thought experiments, and, tellingly, stories — stories about how scientists think and what wonders such thinking can reveal about the world." Pennock teaches at Michigan State University; he is the author of *Tower of Babel* (Cambridge MA: MIT Press, 1999) and the editor of *Intelligent Design Creationism and its Critics* (Cambridge MA: MIT Press, 2001), and he testified in *Kitzmiller v. Dover*. Of interest in the same issue of *American Scientist* is David Kaiser's "The other evolution wars" (518-25), with a page or so on recent attacks on cosmology from young-earth and "intelligent design" creationists; a letter from Homer Jacobson (468-9) asking for a retraction of two passages from a paper of his published in 1955 "because of continued irresponsible contemporary use by creationists"; and a column (466) from the editor, Rosalind Reid, commenting on the co-option of Jacobson's article by creationists and his request for a retraction.

Andrew J Petto was recently in the spotlight at the University of Wisconsin, Milwaukee, when he was profiled by the university's press office (see <http://www4.uwm.edu/about_uwm/news_press/previous_today_at_uwm_detail.cfm?customel_datapageid_11602=143725>). The profile began with a discussion of *Scientists Confront Intelligent*

Design and Creationism (New York: WW Norton, 2007), which Petto co-edited with **Laurie R Godfrey**. Petto told the interviewer: "What makes evolution science is the way we acquire and how we apply the information, not the information itself." Petto also called for university scientists to become further involved in education: "Many scientists chose to teach at a university in order to conduct research, which potentially provides a powerful resource for science education ... We really need to be more involved in assuring that our educational mission receives the benefit of this expertise." A senior lecturer in anatomy and physiology at the University of Wisconsin, Milwaukee, and a member of NCSE's board of directors, Petto is also the editor of *RNCSE*.

Jason Rosenhouse reported on the Discovery Institute's conference Darwin and Design, held in Knoxville, Tennessee, in March 2007, for *Skeptic* magazine (2007; 13 [3]: 11-4). His blow-by-blow account also includes a report of his discussion with a couple of fellow conference-goers: "Several themes were clear. First, the two women did not have the slightest interest in anything I was saying. Second, they had complete and total confidence in every word of the Bible, and regarded it as utter impertinence to challenge them on any such point. Third, they had very little concept of what science is or how scientists approach their work. And fourth, they tended to view me as an object of pity, and generally behaved very condescendingly toward me." Rosenhouse teaches mathematics at James Madison University; he also blogs on the creationism/evolution controversy at <<http://scienceblogs.com/evolution-blog/>>. Also of interest in the same issue of *Skeptic* are NCSE Supporter **Bill Nye's** tribute to the late Don Herbert ("Mr Wizard"; 10); **Raymond Eve's** report on a recent AAAS panel on science education and belief in pseudoscience (14-5); a letter from **William D Stansfield** discussing pseudogenes as evidence for common ancestry (17); Avitai Pilpel's "Cosmos and coincidence: Intelligent design theory fails to

account for sub-optimal design" (18-9); **Niall Shanks**, Ray Greek, Nathan Nobis, and Jean Swingle-Greek writing on "Animals and medicine: Do animal experiments predict human responses?" (44-51); Frans BM de Waal writing on "Bonobos, left and right" (64-6); Jonathan Gottschall's review of **Frederick Crews's** *Follies of the Wise* (67-9); **Norman Levitt's** review of George Levine's *Darwin Loves You* (69-74); and a two-part review of Frank Tipler's *The Physics of Christianity* by Lawrence Krauss (73-4) and Tim Callahan (74-9).

NCSE's executive director **Eugenie C Scott** was featured on "In the Beginning" — a two-part program on religious views regarding creationism and evolution from the BBC World Service. In the first part, Scott interviewed atheist Richard Dawkins, non-theistic cosmologist Paul Davies, old-earth creationist Hugh Ross of Reasons to Believe, theistic evolutionist and Lutheran theologian Ted Peters from the Pacific School of Religion, and young-earth creationist Ken Ham of Answers in Genesis. In the second part, Henry M Morris III of the Institute for Creation Research interviewed atheist David Seaborg, evangelical pastor John MacArthur of The Master's College and Grace Community Church, and evangelical biologist **Margaret Towne**, author of *Honest to Genesis: A Biblical and Scientific Challenge to Creationism* (Baltimore: PublishAmerica, 2004). Toward the end of the segment, Morris traveled to Grand Canyon National Park, where he briefly discussed the history of the canyon with a park interpreter and a Baptist pastor. Finally, Scott and Morris met at the edge of the canyon to share their awe at the canyon's beauty as well as to discuss the diversity of religious reactions to evolution they encountered while conducting their interviews. The whole program is archived on the Templeton-Cambridge Journalism Fellowships in Science & Religion website at <http://www.templeton-cambridge.org/fellows/redfern/publications/2007.03-04/heart_and_soul/>.



Polls Apart on Human Origins

George Bishop

Taking American public opinion polls at face value, one would think the country's scientific establishment faced a never-ending culture war with a Christian army of biblical creationists. "Almost Half of Americans Believe Humans Did Not Evolve" wrote Frank Newport in a June 5, 2006, press release by the Gallup News Service (<[http://](http://www.gallup.com/poll/23200/Almost-Half-Americans-Believe-Humans-Did-Evolve.aspx)

George Bishop is professor of political science and director of the Graduate Certificate Program in Public Opinion and Survey Research at the University of Cincinnati. He is the author of The Illusion of Public Opinion: Fact and Artifact in American Public Opinion Polls (Lanham [MD]: Rowman & Littlefield, 2005).

www.gallup.com/poll/23200/Almost-Half-Americans-Believe-Humans-Did-Evolve.aspx). A year earlier, on July 6, 2005, the Harris Organization reported that "Nearly Two-Thirds of US Adults Believe Human Beings Were Created by God." Other press releases have told us, "Most Americans Tentative About Origin-of-Life Explanations" (Gallup News Service, 2005 Sep 23: <<http://www.gallup.com/poll/18748/Most-Americans-Tentative-About-OriginofLife-Explanations.aspx>>).

What are we to believe? Is the great majority of American adults as firmly opposed to Darwin's theory of evolution as the polls have been telling us for years? Or is pub-

lic opinion on this matter not nearly as settled as many analysts and social scientists have widely assumed? And does the "reality" of public opinion on this subject depend, as with so many other topics, on how the question is asked? Let us take a closer look at the received wisdom.

For nearly a quarter of a century, the Gallup Organization has been painting a pretty familiar portrait of what Americans believe about human origins — and a fairly religious one, at that. Ever since Gallup began asking the question in July of 1982, a remarkably sizable and stable plurality of Americans (44–47%) has claimed to believe in the biblical creation-

Elliott Sober published "Intelligent design theory and the supernatural: The 'God or extra-terrestrials' reply" in *Faith and Philosophy* (2007 Jan; 24 [1]: 72–82). The abstract: "When proponents of Intelligent Design (ID) theory deny that their theory is religious, the minimalistic theory they have in mind (the mini-ID theory) is the claim that the irreducibly complex adaptations found in nature were made by one or more intelligent designers. The denial that this theory is religious rests on the fact that it does not specify the identity of the designer — a supernatural God or a team of extra-terrestrials could have done the work. The present paper attempts to show that this reply underestimates the commitments of the mini-ID [t]heory. The mini-ID theory, when supplemented with four independently plausible further assumptions, entails the existence of a supernatural intelligent designer. It is further argued that scientific theories, such as the Darwinian theory of evolution, are neutral on the question of whether

supernatural designers exist." Sober, a supporter of NCSE, teaches philosophy at the University of Wisconsin, Madison.

NCSE congratulates **Carl Zimmer** for winning a 2007 Communications Award from the National Academy of Sciences, the National Academy of Engineering,



Carl Zimmer

and the Institute of Medicine; he won in the newspapers/magazines/internet category of the prize. A press release issued on October 1, 2007, praised "his diverse and consistently interesting coverage of evolution and unexpected biology," citing in particular:

"Highly Evolved and Exquisitely Thirsty," "Silent Struggle: A New Theory of Pregnancy," "This Can't be Love," and "Devious

Butterflies, Full-Throated Frogs, and Other Liars," published in *The New York Times*; "A Fin is a Limb is a Wing," published in *National Geographic*; and *The Loom*, a science blog hosted by *Seed* magazine.

Zimmer, along with the winners in the book and television/radio categories, was honored during a ceremony on November 14, 2007, at the Arnold and Mabel Beckman Center in Irvine, California; the award brings with it a \$20 000 prize. Zimmer is the author of a number of popular books about biology, including *Evolution: The Triumph of an Idea* (New York: Harper Perennial, 2006), the companion volume to PBS's *Evolution* series; he also received NCSE's Friend of Darwin award for 2005.



ist version of human origins that “God created man pretty much in his present form at one time within the last 10 000 years.” Another whopping percentage (35–40%) has avoided this biblical literalist alternative but nonetheless endorsed the theistic supernatural idea that “man has developed over millions of years from less advanced forms of life, but God guided this process, including man’s creation.” Only a very small percentage (9–13%), however, has accepted the Darwinist, or natural-

istic, position that “man has developed over millions of years from less advanced forms of life. God had no part in this process.”

Taken as a whole, these monotonously familiar findings would seem to indicate that the American public long ago made its mind up about the fundamental question of human origins, and that it was not likely to change that mind any time soon.

This turns out, however, to be a rather premature conclusion. As with so many other poll topics,

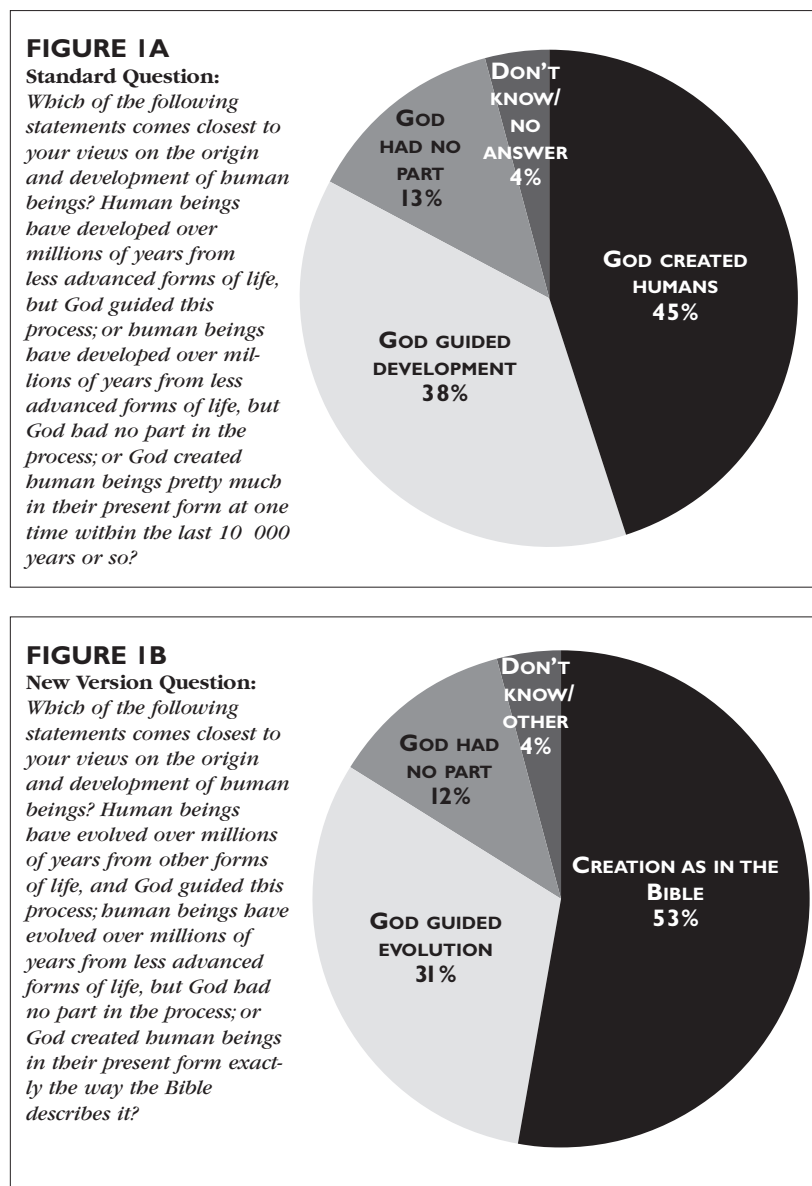
what the American public believes about human origins looks now to be much more sensitive to how the question is asked than many observers have so far surmised. Indeed, a conspicuous example turned up in a September 2005 poll conducted by the Gallup Organization itself, in which the wording of its standard question on human origins was changed, evidently to specify more precisely the exact meaning of the creationist or biblical alternative. Presumably this experiment in wording, shown in Figure 1, was done because of suspicions that the standard question was exaggerating the “true” percentage of believers in the Genesis version.

But, alas, the numbers in Figure 1, comparing the results with those for the standard question, tell another tale of unintended consequences. The percentage endorsing the Darwinist alternative was essentially unaffected by the change in wording. But, unexpectedly, Gallup’s more precise way of putting the biblical alternative attracted a significantly higher percentage of respondents than it ever had — in fact, a clear creationist majority! At the same time, this manipulation in wording noticeably decreased the percentage selecting the *theistic evolutionist* position to less than a third (31%) — its lowest point in nearly a quarter-century of polling. Furthermore, the difference in the percentage choosing the *biblical creationist* versus the *theistic evolutionist* alternative in the Gallup poll tripled, rising from 7% in a November 2004 asking of the standard question to 22% in the version asked in 2005.

That, surely, was not the intention of the intelligent designers of this experiment. If nothing else, Gallup’s telling experiment of unintended consequences suggested that Americans’ beliefs about human origins were not quite as stable and psychologically structured as nearly everyone had been assuming for years — a finding replicated in a number of other recent polls on the human origins issue.

The polling results presented here, together with those in

FIGURE 1: STRICT BIBLICAL VERSION ATTRACTS MAJORITY



Note: The latest asking of the standard question yielded the following results: God created humans, 46%; God guided development, 36%; God had no part, 13%; Don't Know (DK)/Other, 5%.

Source: Surveys by the Gallup Organization, November 2004 and September 8–11, 2005.

FIGURE 2: NO EXPLICIT MENTION OF GOD

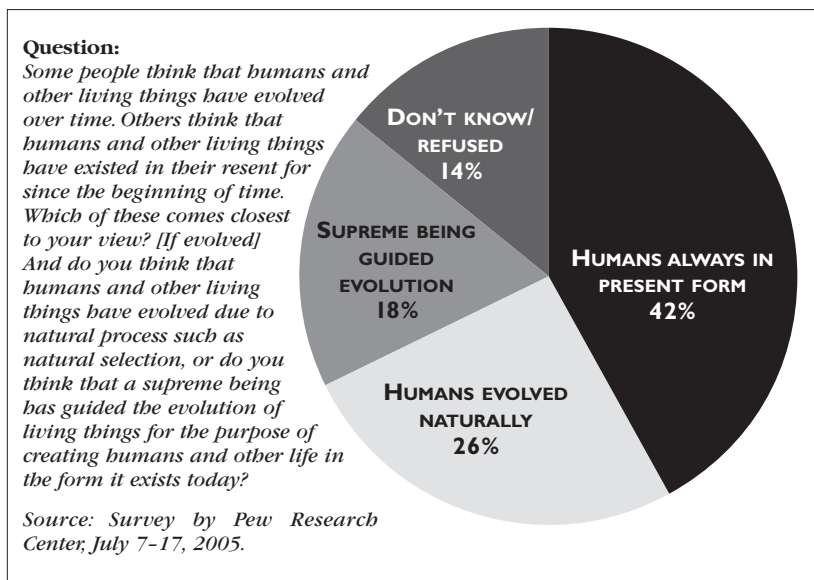


Figure 1, tell rather different stories about what Americans believe regarding how human beings came to be; indeed, they are, as we say, “polls apart.” Consider the results of the July 2005 Religion and Public Life Survey (<<http://people-press.org/reports/display.php3?ReportID=254>>) conducted by the Pew Research Center (Figure 2).

Unlike the Gallup Organization’s standard question on human origins, which many respondents might well interpret *implicitly* as a question about their belief in God, the questions asked in the Pew poll did not explicitly mention God (*see sidebar, p 41*). First of all, respondents simply had to indicate whether they thought that “humans and other living things have evolved over time,” or whether they believed that they “have existed in their present form since the beginning of time.” If they thought humans evolved over time, they were then asked to say whether they thought this was due to “natural processes such as natural selection” or because “a supreme being guided the evolution of living things for the purpose of creating humans and other life in the form it exists today.”

Asked in this way, 42% of respondents said they believed humans and other living things have existed in their present form since the beginning of time, a figure not that different from what

Gallup reported in response to its standard question in 2004 and 2006 (45% and 46%, respectively), in which the wording of the creationist option was somewhat similar. But the Pew estimate of those choosing the biblical creationist position (42%) differed notably from that discovered in the Gallup poll of September 2005 (53%), in which Gallup reworded its description of the creationist alternative to link it more exactly to “the way the Bible describes it.”

The Pew Center questions also produced rather different estimates of those believing in the alternatives to the creationist position. Approximately twice as many respondents in the Pew survey endorsed the naturalistic or Darwinist option as did those given the godless-evolution alternative in the Gallup polls. Even more striking, fewer than one out of five respondents in the Pew poll chose the theistic-evolutionist position of humans’ evolving under the guidance of God, as compared to nearly a third (31%) in the September 2005 Gallup survey and 36–38% in the 2004 and 2006 Gallup polls.

A journalist, politician, or public policymaker looking at one or the other of these conflicting poll results would thus reach rather different conclusions about what Americans really believed about the origins of human life. Examining the Gallup results of

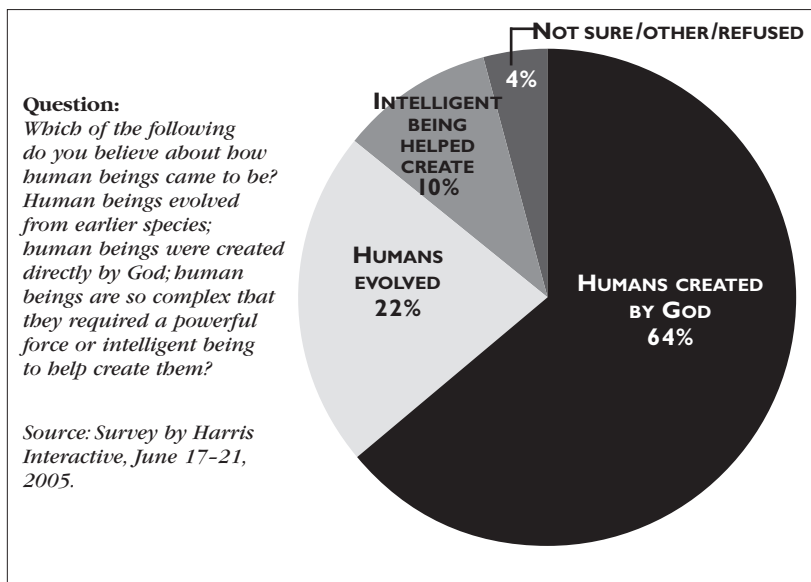
September 2005, for example, he or she would most likely think a clear majority of Americans subscribed to the traditional Christian, biblical version of the creation of human beings, that roughly another third believed God had a major role in the process, and that only a very small minority thought humans evolved without any kind of God involved in the process.

In contrast, the same observer spotting the results of the Pew survey might well conclude that, while a definite plurality of Americans appeared to accept the conventional biblical position on human origins, this figure is somewhat lower than what the Gallup Organization has been reporting for the past couple of decades. More importantly, he or she would most likely notice from the Pew survey that the American public has evidently become much more receptive to the idea that human evolution has occurred through the Darwinian process of natural selection, with over a fourth of Americans now choosing that option, as compared to just 10–12% selecting the naturalistic position in previous Gallup polls. Like so many other experiments with the wording of survey questions, the two polls create two different-looking publics — two different social realities (Bishop 2005).

A press release from a third poll conducted by Harris Interactive during the same general time period (June 2005) generated yet another image of what Americans thought about the human evolution issue (Figure 3). According to the headline, “Nearly Two-Thirds of US Adults Believe Human Beings Were Created by God.” Beating its polling competitors to the punch, the question asked in the Harris Interactive survey, shown in Figure 3, included an explicit response alternative that tried to capture the “intelligent design” position that had become the focus of national attention in the Dover, Pennsylvania, trial of 2005 (*see, for example, the Associated Press, 2005 Dec 20: <<http://www.msnbc.msn.com/id/10545387/>>*).

Framed in this new mode, nearly two-thirds of American adults said they believed in the biblical

FIGURE 3: “INTELLIGENT DESIGN” POSITION OFFERED



literalist position that “human beings were created directly by God.” Over a fifth endorsed the naturalistic claim that “humans evolved from earlier species.” But, curiously, only one out of ten chose the “intelligent design” proposition that “human beings are so complex that they required a powerful force or intelligent being to help create them.” Because this “intelligent-design” alternative was presented immediately after the option that “human beings were created directly by God,” many respondents may well have interpreted it as implying a

godless “powerful force” or “intelligent being,” and thus chose to avoid the implication that they did not believe in God by selecting, as a default, the biblical creationist option.

Furthermore, when asked directly in the Harris survey, “Do you think human beings developed from earlier species or not?” 38% said yes, suggesting that the American public might be more accepting of the concept of evolution than the responses to the initial Harris question about human origins would indicate, especially if God were not explicitly men-

tioned and the word “evolved” were not used.

Another piece of evidence for this question-framing hypothesis comes from responses to a third question asked in the same Harris Interactive survey: “Do you believe apes and man have a common ancestry or not?” Asked in this more scientifically correct way, nearly half of American adults (46%) said “yes” to the idea of a shared ancestry — down from what it was in a 1996 Harris survey (51%), but still fairly impressive, given all the press releases (such as Gallup News Service, 2001 Mar 5, <<http://www.gallup.com/poll/1942/Substantial-Numbers-Americans-Continue-Doubt-Evolution-Explan.aspx>>) over the years telling us how favorable the public has been towards the biblical creationist account of human origins.

One final piece of evidence from Harris for Americans’ unexpected receptivity to evolutionary thought showed up in respondents’ reactions to the statement, “Darwin’s theory of evolution is proven by fossil discoveries.” Nearly half (46%) agreed, either strongly or somewhat, with this supposedly controversial claim in religious-minded America — hardly what one would expect from reading the Gallup polls.

Results from an NBC News poll on beliefs about human origins raise even more doubts about the American public’s supposed great resistance to the theory of evolution. Taking special care to clarify what respondents meant when they said they believed in the biblical account of creation, the NBC interviewers asked them the question shown in Figure 4.

With the question posed in this manner, 44% said they literally believed that “God created the world in six days and rested on the seventh as described in the Book of Genesis.” Only 13% thought God was just “a divine presence in the formation of the universe.” But amazingly, some might say, a third (33%) of the respondents chose evolution as the best explanation of human life on earth — roughly triple the average percentage (10.6%) reported in the Gallup polls over

FIGURE 4: GENESIS VERSUS DIVINE PRESENCE?

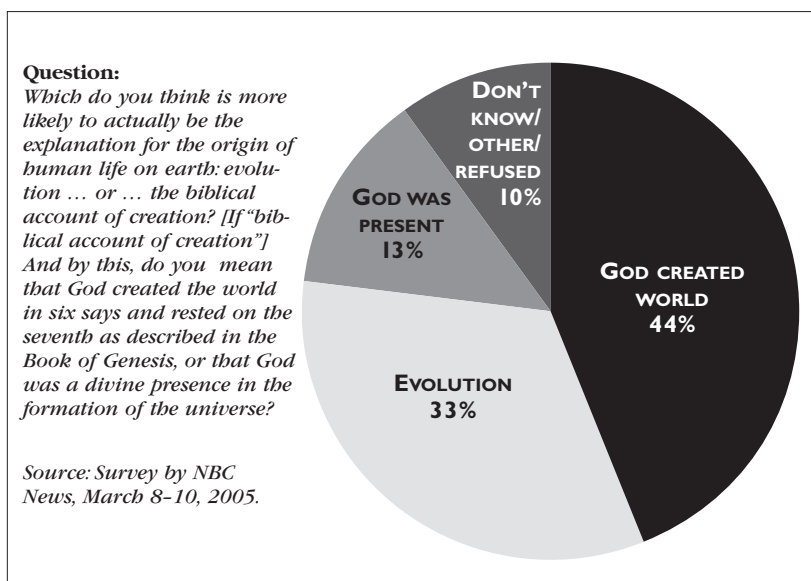


FIGURE 5: EVEN MINOR CHANGES MAKE A DIFFERENCE

FIGURE 5A

Question:
Which of the following statements comes closest to your views on the origin and development of human beings? ... Human beings evolved from less advanced life forms over millions of years, and God did not directly guide this process; human beings evolved from less advanced life forms over millions of years, but God guided this process; God created human beings in their present form?

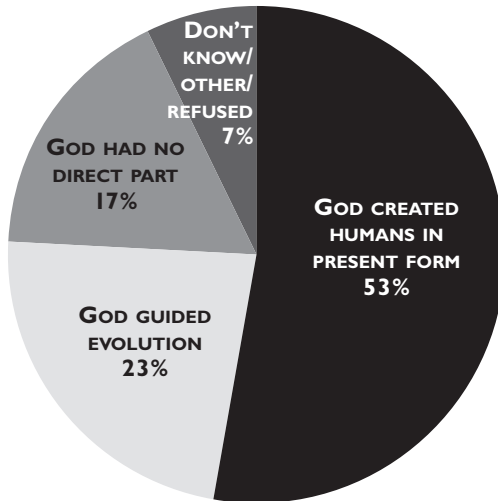
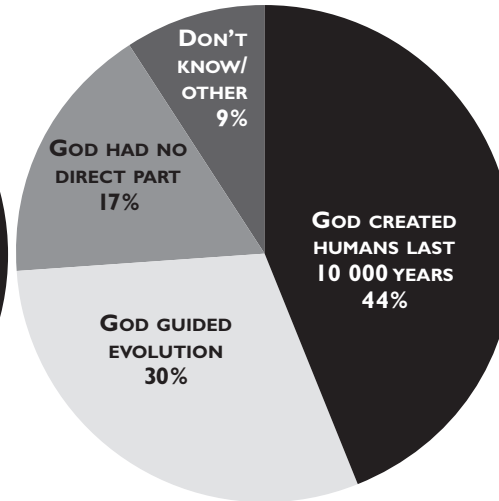


FIGURE 5B

Question:
Which of the following statements comes closest to your views on the origin and development of human beings? Human beings have evolved over millions of years, and God guided this process; human beings evolved over millions of years from other forms of life, but God had no part in this process; God created human beings in their present form within the last ten thousand years?



Source: Survey by CBS News, April 6-9, 2006.

FIGURE 6: ANOTHER MESSY COMPLICATION

FIGURE 6A

Question:
As I read off three statements, please tell me which one comes closest to your views about the origin and development of man. ... God created man pretty much in his present form at one time within the last 10 000 years; man has developed over millions of years from less advanced forms of life and God had no part in this process; man has developed over millions of years from less advanced forms of life, but God guided this process, including man's creation.

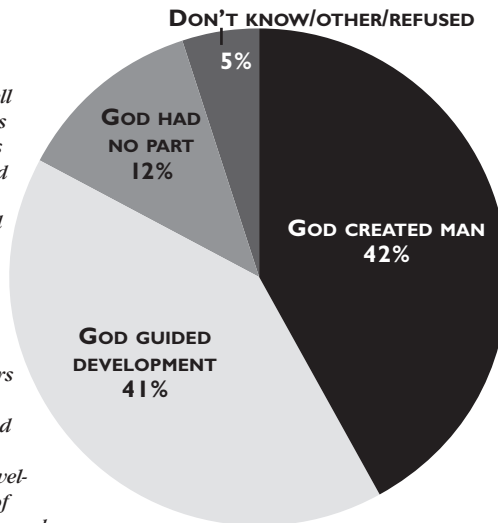
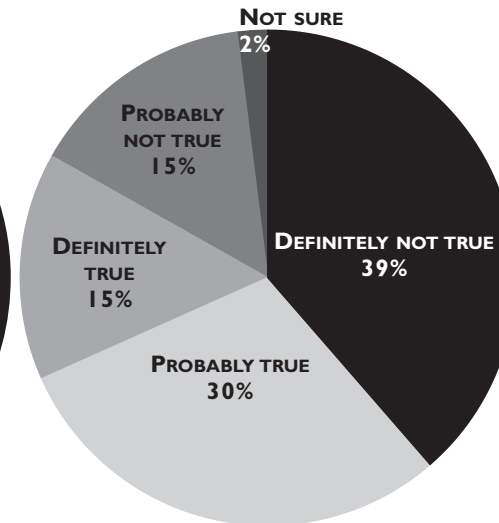


FIGURE 6B

Question:
From the statement I'll read, look at this card and tell me which answer comes closest to your opinion on how true it is ... definitely true, probably true, probably not true, definitely not true: Human beings developed from earlier species of animals.



Source: Survey by NORC-GSS, August 18, 2004 - January 4, 2005.

the past twenty to twenty-five years.

As if all this were not enough, questions on human origins in a CBS News poll provide further evidence that even very minor alterations in how the question is asked can make a noticeable difference in portraying what Americans supposedly believe.

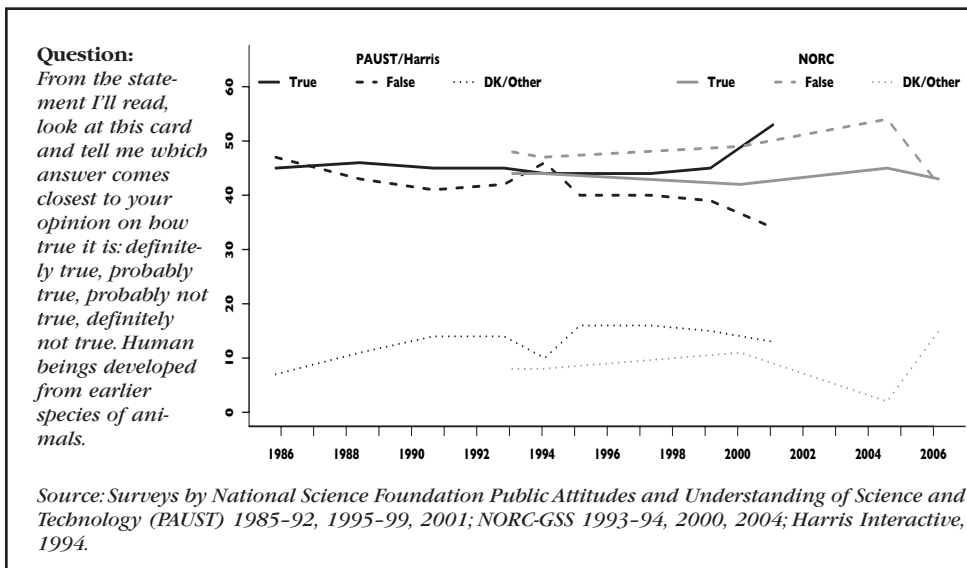
With one version of the question asked by CBS (Figure 5A), a

majority of Americans appeared to subscribe to the creationist view that "God created human beings in their present form." But with the other version (Figure 5B), which added the more specific description, "within the last ten thousand years," the seeming majority endorsing the biblical creationist position evaporated.

Adding yet another messy complication to the mix, the National

Opinion Research Center General Social Survey (NORC-GSS) in 2004-2005 included an exact wording of the original Gallup question on human origins (Figure 6A). Surprisingly, this replication elicited a noticeably smaller percentage of respondents (42%) who said they believed that "God created man pretty much in his present form within the last 10 000 years" as compared to more recent

FIGURE 7: TREND IN EVOLUTION BELIEF



Gallup replications in 2004 and 2006 (45-46%). Just 12% of the respondents in the NORC-GSS appeared, as in most previous Gallup polls, to endorse the evolutionist position that “man has developed over millions of years from less advanced forms of life. God had no part in this process.” But, curiously, when asked in the very next question whether they believed that it was either definitely or probably “true” that “Human beings developed from earlier species of animals,” nearly half said yes (Figure 6B)!

This figure suggests there may be three to four times as many American adults who accept the basic premise of the theory of evolution

than is typically indicated by the standard Gallup question on human origins.

Furthermore, various polling organizations have asked this last question, which is an exact replicate of the item currently asked in the National Science Foundation project, Public Attitudes and Understanding of Science and Technology (PAUST) (<http://www.ropcenter.uconn.edu/dataacq/nsf_surveys_science_technology.html>). With one notable exception (2001) and minor variations in wording, the trend, shown in Figure 7, looks remarkably stable.

On average (using the median), the percentage endorsing the

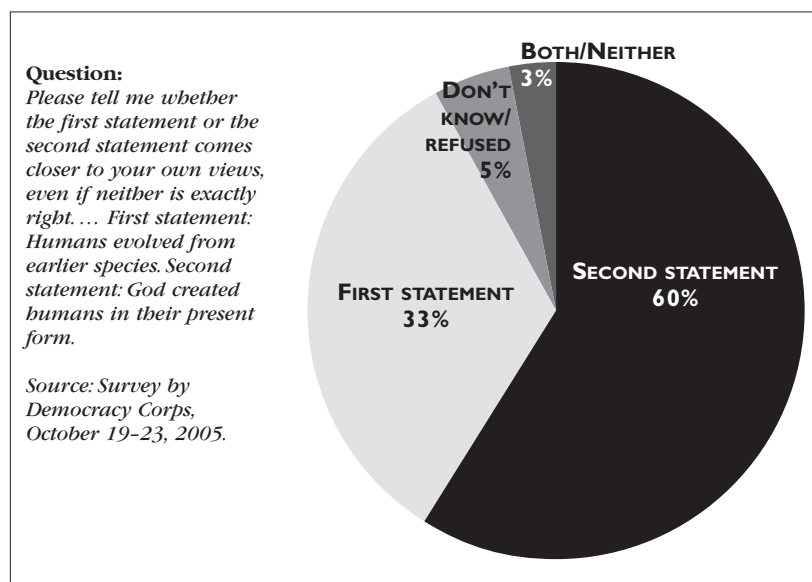
proposition that “human beings, as we know them today, developed from earlier species of animals” has hovered around 45% for the past twenty years. How different an impression of the American public this gives us as compared to the standard Gallup polls of the same era — a result most likely due to differences in mass media coverage favoring press releases via the commercial medium of the Gallup News Service.

Yet another permutation of the question by the Democracy Corps Poll in October 2005 (<http://archive.democracycorps.com/reports/surveys/Democracy_Corps_October_19-23_2005_Survey.pdf>) pitted a PAUST-like alternative about human origins — “Humans evolved from earlier species” — against a Gallup-like creationist alternative, “God created humans in their present form.” Presenting these polar alternatives, however, made the American public look lopsidedly creationist, with 60% choosing the biblical stance (Figure 8).

As a final installment, consider the variation of the human origins question asked by the Virginia Commonwealth University (VCU) in its Life Sciences Survey of September 2005 (<<http://www.news.vcu.edu/news.aspx?v=detail&nid=1303>>). In this case, the question, shown in Figure 9, made no mention whatsoever of the origin of “human life,” referring instead to the origin of “biological life”.

This sanitizing of the question made but a modest difference. Including a mention of God produced results resembling earlier Gallup polls on human origins, with more than four out of ten respondents telling interviewers they believed “God directly created biological life in its present form at one point in time.” Only about a fourth of them, however, subscribed to the theistic-evolutionist notion that “Biological life developed over time from simple substances, but God guided this process.” A notable portion also thought that “biological life developed over time from simple substances, but God did not guide this process.” So, by characterizing it as “biological life” rather than

FIGURE 8: DEMOCRACY CORPS



“human life,” the VCU experiment may have reduced, somewhat, resistance to the theory of evolution.

All of this goes to show how easily what Americans appear to believe about human origins can be manipulated by how the question is asked. As we have seen, depending on the wording of the question the percentage of apparent biblical creationists can vary from as little as 42% to as high as 64%; the percentage of theistic evolutionists or believers in “intelligent design” from as much as 41% to as little as 10–18%; and the percentage of Darwinist or naturalistic evolutionists, from as low as 10–13% to as high as 33–46%.

What are we to conclude from these messy results about something as supposedly fundamental as Americans’ religious beliefs about the role of God in creating human life? Are Americans poles apart on this perennial “culture war” question, as some would have us believe, or merely polls apart? American public opinion on this matter would seem to be a lot more malleable than we have heretofore suspected.

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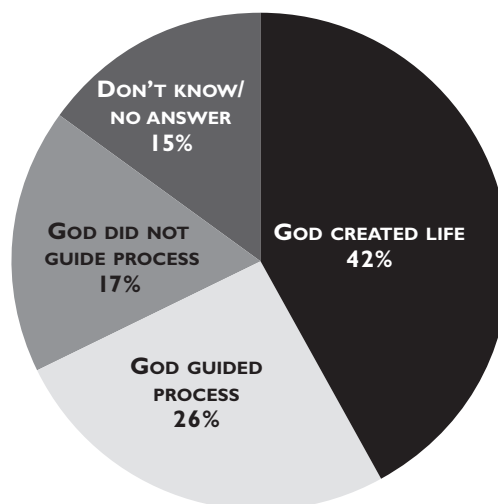
[Originally published in the August/September 2006 issue of *Public Opinion Pros* magazine at <<http://www.PublicOpinionPros.com>> and reprinted with permission. Figures were redrawn and corrected where necessary; special thanks to Joshua Rosenau for redrawing Figures 6b and 7.]

FIGURE 9: THE ORIGIN OF BIOLOGICAL LIFE

Question:

Which of the following statements come closest to your views on the origin of biological life? Biological life developed over time from simple substances, but God guided this process; biological life developed over time from simple substances, but God did not guide the process; God directly created biological life in its present form at one point in time.

Source: Survey by Virginia Commonwealth University, September 14–17, 2005.



NOTE ON THE PEW STUDY

Just before being asked this sequence of questions about human origins, respondents in the Pew poll were asked to indicate whether or not they believed in God, a universal spirit, or a higher power and, if yes, whether they thought God, the universal spirit, or this higher power was responsible for the creation of life on earth. Of those who believed in God (85%), 92% thought God was responsible for the creation of life on earth; 6% did not believe this; and 2% said “don’t know.” And of those who did not believe in God, but did believe in a universal spirit or higher power, 45% said this universal spirit or higher power was responsible for the creation of life on earth; 45% did not believe it; and 9% didn’t know. So, contextually speaking, respondents were certainly primed to think about the role of a God, a universal spirit, or higher power in answering the subsequent questions about human evolution — a potential bias that cannot be ruled out in the absence of a controlled experiment.

DUNCAN AND GEIST ON POLLS

In “The creationists: How many, who, and where?” (*RNCSE* 2004 Sep/Oct; 24 [5]: 26–33), Otis Dudley Duncan and Claudia Geist studied poll data on public opinion regarding evolution and creationism from the Gallup Poll and the General Social Survey. Among their findings: “women are somewhat more likely to be men to be creationists, the elderly more so than the young, African-Americans more than whites, those who attend religious services more often than those who attend seldom or never, political conservatives more than liberals, and those agreeing with the pro-life position than those classified as pro-choice on abortion.” The most startling finding, they wrote, was the relationship between creationism and education: “In the sector defined by firm belief in God in combination with biblical literalism and medium to high frequency of attendance at religious services ... people with more advanced schooling actually are more likely to be creationists than those with lesser amounts of education.” “The Bible Belt,” they concluded, “is bigger than readers may have thought, not only geographically but also metaphorically.”



In Praise of the Bravery of Biology Teachers

Frans de Waal

[Asked by Time magazine to provide a nomination for the 2007 Person of the Year, Frans de Waal wrote, "I nominate all the brave biology teachers of this nation who teach evolution despite the opposition they encounter. Without evolution, there is no biology; without biology, there is no medicine. It's as simple as that. These teachers arm their pupils with the knowledge they need, putting them on level footing with the rest of the world where evolutionary theory is uncontroversial." His words appeared in the November 26, 2007, issue of Time. NCSE asked him to amplify on his nomination, and we are pleased to publish his further comments here.]

I made this nomination and offered this quote, because I feel it is truly remarkable that so many teachers in this nation have the courage to go against the opinion of parents and sometimes school boards to defend science in the face of what I consider medieval ideas. The idea that the world was created a couple of thousand years ago is not any more believable than the idea that the cosmos revolves around the earth or that the earth is flat. To revamp this line of thinking by calling it "intelligent design" and giving it a scientific flavor doesn't change anything. The fact remains that 99%, or more, of my fellow biologists are convinced that evolution offers the most comprehensive and best theory, and that "intelligent design" is simply untestable, which is the worst thing scientists can say about any idea.

I admire the persistence of teachers to do what is right, to defend the evidence-based

approach to the truth that is science, and to risk the wrath of people who believe that "theory" means "we don't know." In science, "theory" simply means that we have a way of finding out, which is far more than can be said of faith.

When I came to this country, one of the things that struck me right away is its irrational approach to biology. Mind you, this was twenty-five years ago, and at the time I just hoped it would blow over. It never did, however, and I have become pretty desperate about it. How come that all modern nations accept evolutionary theory and don't even consider it a point of debate, but not the US? Is it a small minority that thwarts progress, or is there a deep-down resistance? And if so, where does it come from?

One of the issues often brought up is the misunderstanding that if we were to believe that humans descended from "monkeys" and that God was not part of the process, this would imply the absence of a moral compass. Evolution would conflict, in this view, with a society based on values. People sometimes tell me, "to believe in evolution means I could rape my neighbor and it would be fine." I find this a strange idea, and

I must say that in fact I don't very much like meeting people who are only stopped from raping their neighbor by their belief in God.

My personal belief is that nature is wonderful. For me, there is nothing negative about being part of nature. Moral rules, insofar as we have and obey them, have a basis in evolved human nature; hence in the animal kingdom as a whole. Nature does not prescribe how we should live, but it has given us the capacity for empathy and sympathy, and has produced cooperative tendencies, all of which we relied upon when we constructed a moral world.

Teachers should be free to communicate all of these exciting ideas about the role of biology and the evolution of the human species. Biology has so much to offer. It is in fact the most exciting discipline of our age, so let the teachers convey this excitement without being hampered by the outdated ideas of previous, uninformed eras.

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GRAVITY : It's Only a Theory

Ellery Schempp

[Textbook disclaimers are down, but not out. This satirical look at "only a theory" disclaimers imagines what might happen if advocates applied the same logic to the theory of gravitation that they do to the theory of evolution.]

All physics textbook should include this warning label:

This textbook contains material on Gravity. Universal Gravity is a theory, not a fact, regarding the natural law of attraction. This material should be approached with an open mind, studied carefully, and critically considered.

The Universal Theory of Gravity is often taught in schools as a fact, when in fact it is not even a good theory.

First of all, no one has measured gravity for every atom and every star. It is simply a religious belief that it is "universal".

Secondly, school textbooks routinely make false statements. For example, "the moon goes around the earth." If the theory of gravity were true, it would show that the sun's gravitational force on the moon is much stronger than the earth's gravitational force on the moon, so the moon would go around the sun. Anybody can look up at night and see the obvious gaps in gravity theory.

The existence of tides is often taken as a proof of gravity, but this

is logically flawed. Because if the moon's "gravity" were responsible for a bulge underneath it, then how can anyone explain a high tide on the opposite side of the earth at the same time? Anyone can observe that there are *two* — not *one* — high tides every day. It is far more likely that tides were given us by an Intelligent Creator long ago and they have been with us ever since. In any case, the fact that there are two high tides falsifies gravity.

There are numerous other flaws. For example, astronomers, who seem to have a fetish for gravity, tell us that the moon rotates on its axis but at the same time it always presents the same face to the earth. This is patently absurd. Moreover, if gravity were working on the early earth, then earth would have been bombarded out of existence by falling asteroids, meteors, comets, and other space junk. Furthermore, gravity theory suggests that the planets have been moving in orderly orbits for millions and millions of years, which wholly contradicts the Second Law of Thermodynamics. Since everything in the Universe tends to disorder according to the Second Law, orderly orbits are impossible. This cannot be resolved by pointing to the huge outpouring of energy from the sun. In fact, it is known that the flux of photons from the sun and the "solar wind" actually tends to push earth away.

There are numerous alternative theories that should be taught on an equal basis. For example, the observed behavior of the earth's revolving around the sun can be

perfectly explained if the sun has a net positive charge and the planets have a net negative charge, since opposite charges attract and the force is an inverse-square law, exactly as proposed by the increasingly discredited Theory of Gravity. Physics and chemistry texts emphasize that this is the explanation for electrons going around the nucleus, so if it works for atoms, why not for the solar system? The answer is simple: scientific orthodoxy.

The US Patent Office has never issued a patent for anti-gravity. Why is this? According to natural law and homeopathy, everything exists in opposites: good-evil; grace-sin; positive charges-negative charges; north poles-south poles; good vibes-bad vibes; and so on. We know there are anti-evolutionists, so why not anti-gravitationalists? It is clearly a matter of the scientific establishment elite's protecting their own. Anti-gravity papers are routinely rejected from peer-reviewed journals, and scientists who propose anti-gravity quickly lose their funding. Universal gravity theory is just a way to keep the grant money flowing.

Even Isaac Newton, said to be the discoverer of gravity, knew there were problems with the theory. He claimed to have invented the idea early in his life, but he knew that no mathematician of his day would approve his theory, so he invented a whole new branch of mathematics, called fluxions, just to "prove" his theory. This became calculus, a deeply flawed branch having to do with so-called "infinitesimals" which have never been observed. Then when

Ellery Schempp is a long-time NCSE member and defender of evolution education.

Einstein invented a new theory of gravity, he, too, used an obscure bit of mathematics called tensors. It seems that every time there is a theory of gravity, it is mixed up with fringe mathematics. Newton, by the way, was far from a secular scientist, and the bulk of his writings is actually on theology and Christianity. His dabbling in gravity, alchemy, and calculus was a mere sideline, perhaps an aberration best left forgotten in describing his career and faith in a Creator.

To make matters worse, proponents of gravity theory hypothesize about mysterious things called gravitons and gravity waves. These have never been observed, and when some accounts of detecting gravity waves were published, the physicists involved had to quickly retract them. Every account of anti-gravity and gravity waves quickly elicits laughter. This is not a theory suitable for children. And even children can see how ridiculous it is to imagine that people in Australia are upside down with respect to us, as gravity theory would have it. If this is an example of the predictive power of the theory of gravity, we can see that at the core there is no foundation.

Gravity totally fails to explain why Saturn has rings and Jupiter does not. It utterly fails to account for obesity. In fact, what it does "explain" is far outweighed by what it does not explain.

When the planet Pluto was dis-

covered in 1930 by Clyde Tombaugh, he relied on "gravitational calculations". But Tombaugh was a Unitarian, a liberal religious group that supports the Theory of Gravity. The modern-day Unitarian-Universalists continue to rely on liberal notions and dismiss ideas of anti-gravity as heretical. Tombaugh never even attempted to justify his "gravitational calculations" on the basis of Scripture, and he went on to be a founding member of the liberal Unitarian Fellowship of Las Cruces, New Mexico.

The theory of gravity violates common sense in many ways. Adherents have a hard time explaining, for instance, why airplanes do not fall. Since anti-gravity is rejected by the scientific establishment, they resort to lots of hand-waving. The theory, if taken seriously, implies that the default position for all airplanes is on the ground. While this seems true for Northwest Airlines, it appears that JetBlue and Southwest have a superior theory that effectively harnesses forces that overcome so-called gravity.

It is unlikely that the Law of Gravity will be repealed given the present geo-political climate, but there is no need to teach unfounded theories in the public schools. There is, indeed, evidence that the Theory of Gravity is having a grave effect on morality. Activist judges and left-leaning teachers often use the phrase "what goes up must come down" as a way of describ-

ing gravity, and relativists have been quick to apply this to moral standards and common decency.

Finally, the mere name, "Universal Theory of Gravity" or "Theory of Universal Gravity" (the secularists like to use confusing language) has a distinctly socialist ring to it. The core idea of "to each according to his weight, from each according to his mass" is communistic. There is no reason that gravity should apply to the just and the unjust equally, and the saved should have relief from such "universalism." If we have Universal Gravity now, then universal health care will be sure to follow. It is this kind of universalism that saps a nation's moral fiber. It is not even clear why we need a theory of gravity: there is not a single mention in the Bible, and the patriotic Founding Fathers never referred to it.

Overall, the Theory of Universal Gravity is just not an attractive theory. It is based on borderline evidence, has many serious gaps in what it claims to explain, is clearly wrong in important respects, and has social and moral deficiencies. If taught in the public schools, by mis-directed "educators", it has to be balanced with alternative, more attractive theories with genuine gravamen and spiritual gravitas.

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UNION OF CONCERNED SCIENTISTS ADDS ITS VOICE FOR EVOLUTION

On September 4, 2007, the Union of Concerned Scientists issued "Science, Evolution, and Intelligent Design," a statement (available on-line at <http://www.ucsusa.org/scientific_integrity/interference/statement-on-id.html>) expressing concern about "current attempts to mandate the teaching of 'intelligent design' and other non-scientific accounts of the origins of species and biological diversity in our nation's science classrooms" and "the misleading interpretations of scientific principles being used to discredit and misrepresent the science of evolution," and calling for "the mobilization of scientists, teachers, policy makers, and concerned citizens to combat efforts to undermine science education and the integrity of science."

Together with the statement, the Union of Concerned Scientists provided a six-section primer (available on-line at <http://www.ucsusa.org/scientific_integrity/interference/intelligent-design.html>) "on the scientific theory, evolution, and intelligent design, along with discussions of why intelligent design is not science, why it should not be part of the science curriculum, and the broader implications anti-evolution efforts can have on society." The Union of Concerned Scientists is an independent, nonprofit alliance of more than 200 000 citizens and scientists, basing its research and outreach on rigorous scientific analysis and the maintenance of scientific integrity in decision making among the public and policy makers.

BOOKREVIEWS

OUR INNER APE: A LEADING PRIMATELOGIST EXPLAINS WHY WE ARE WHO WE ARE

by Frans de Waal
New York: Riverhead Books, 2005.
288 pages

Reviewed by Anne D Holden

There are only a few names within the field of primatology that are recognizable to the general public, and Frans de Waal certainly falls into this category. The noted Emory University primatologist has studied our closest living relatives, chimpanzees and bonobos, for nearly 30 years. He has authored countless scientific articles and texts, as well as several books. While his previous works have focused on such topics as chimpanzee politics and ape social complexity, de Waal's 2005 book looks at similarities between humans and our two closest living ape relatives. Entitled *Our Inner Ape: A Leading Primatologist Explains Why We Are Who We Are*, this book looks at various aspects of what most people believe to be distinctively human characteristics, including love, kindness, and power, explaining them in the context of our evolutionary cousins: chimpanzees and bonobos.

Yet instead of simply describing cultural traits that we may share with chimpanzees or bonobos, de Waal continually poses the question: to which species we are more similar, the often-violent chimpanzee, or the peaceful and overtly sexual bonobo? De Waal attempts to find an answer to this question through the examination of the human characteristics of power, sex, violence, and kindness.

One of the strengths of de

Waal's writing is his vast amount of first-hand experience, having worked with chimps and bonobos at facilities both in his native Netherlands and in the US. De Waal uses these experiences to help to explain important similarities between human and chimpanzee/bonobo cultures. In chapters on power, sex, violence, and kindness, he offers powerful examples of how chimpanzees or bonobos exhibit the characteristic in question, often in a very human-like manner. Indeed, it is these examples, peppered throughout each chapter, that allow this book to be enjoyed by a wide audience.

For instance, in the chapter on power, de Waal describes a struggle for male dominance that took place between three chimpanzees in the Arnhem zoo in Amsterdam. In this touching story, de Waal tells how the alpha male, Luit, was attacked by two other chimps, Yeoren and Nikkie, as a response to Luit's fast ascent to power within the group. Yeoren and Nikkie had formed an alliance, whose purpose was to get rid of Luit and then take over control of the group. Unfortunately, Luit did not survive the encounter, and this display of both violence and strategy leads de Waal to remark, "Those two had been plotting against him in order to take back the power they had lost. The shocking way they did so opened my eyes to how deadly seriously chimpanzees take their politics" (p 43). Noting that political murder is also present in our

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species, de Waal observes that the struggle for power among both chimpanzees and humans illustrates just how closely related to each other we are.

However, though humans' violent nature can be compared accurately to that of chimpanzees, perhaps our sex drive can be compared more accurately to that of bonobos. Bonobos used to be known as "pygmy chimpanzees," but have since been upgraded to their own separate species within the family of great apes. Though they are physically similar to chimpanzees, their social structure and culture is markedly different, especially with regard to sex. De Waal examines human sexuality in the same way he examines human violence: in the context of our ape relatives. Indeed, de Waal begins his discussion on sexuality by asking, "Why are people and bonobos such sexual hedonists? Why are we endowed with sexual appetites beyond those needed to fertilize the occasional egg and beyond the partners who make this possible?" (p 96). De Waal then continues on an exploration of multiple aspects of both human and ape sexuality, covering such topics as homosexuality, child-rearing, and infanticide. He then ends his discussion on how we came to differ from bonobos in our sexuality, pointing to the evolution of the nuclear family as a step towards reduction of overt sexual competition, which in turn increased cooperation among these family units. De Waal finally proposes that our success as a species may have been a result of an abandonment of the "bonobo lifestyle" in favor of a tighter control of our sexual expressions.

De Waal's final chapter takes the characteristics on which he focuses — power, sex, violence, and kindness — and asks which



species humans are more similar to: chimpanzees or bonobos? However, de Waal argues that attempting to categorize ourselves in this way is fruitless, as we humans are much too bipolar: we cooperate and we compete, we are characterized by hate and by love. Further, de Waal argues that if we are “essentially apes, or at least descended from apes, we are born with a gamut of tendencies from the basest to the noblest. ... our morality is a product of the same selection process that shaped our competitive and aggressive side” (p 237). In other words, when attempting to discover from where our humanity evolved, we must look towards both our closest living relatives: chimpanzees *and* bonobos; and that both these species represent our two “inner apes.”

De Waal’s exploration of our “inner ape” is largely readable and often engaging, and even a reader with only a general interest in primatology would have no trouble understanding the arguments that de Waal presents. However, advanced primatologists and students might find the subject matter rather basic, as there is not much new research discussed in the book. In addition, the reliance on vivid, often emotional examples may put off some veteran primatologists who would prefer a more straightforward or dry approach. Yet it is clear that de Waal was not trying to create a data-heavy textbook on human and ape cultures. Rather, de Waal’s argument that humans exhibit important qualities of both chimpanzees and bonobos is well-developed, organized, and is complemented by excellent examples from his years in close contact with these animals. As a result, the reader is left with a solid understanding of what it means to be human, as well as what it means to be an ape; something that would be appealing to anyone with a general interest in anthropology and psychology.

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JUST A THEORY: EXPLORING THE NATURE OF SCIENCE

by Moti Ben-Ari
Amherst (NY): Prometheus Books,
2005. 237 pages

**Reviewed by
Michael Zimmerman**

The most common criticism anyone involved in the evolution/creationism controversy is likely to hear is that evolution is just a theory, and thus there’s no reason to privilege it over other ideas. Although Ben-Ari does not focus exclusively on evolution, he does pay it significant attention as he attempts to explain what it means for a scientific idea to rise to the level of theory.

He does a nice job, for example, of comparing the theory of gravity to the theory of evolution, pointing out that while there is no public controversy over the former, a great deal more is actually known about the latter. Sophisticated evolutionary mechanisms abound with a great deal of research being produced each year designed to determine the conditions under which each operates. A mechanism for gravity, on the other hand, is still purely conjectural with no solid evidence that gravitons — gravitational waves, and particles hypothesized to be “analogous to the electromagnetic waves and photons that come from electromagnetic fields” — actually exist. In the light, somewhat humorous style that permeates the book, Ben-Ari concludes, “Currently, the evidence [for gravitons] is controversial, so we must live with the embarrassment of risking our lives on a theory whose mechanism is not fully understood” (p 32).

Ben-Ari makes his comparative point very clear: “the theory of evolution more than fulfills all of

the requirements of scientific ‘theoryhood,’ even more than the theory of gravitation. To brand evolution as ‘just a theory’ is the finest compliment one can confer on it!” (p 38).

The only reasonable conclusion to be drawn from this discrepancy is that those who attack evolution for being just a theory are clearly not doing so on scientific grounds. If the theory of gravity could be interpreted by some to have political ramifications, it too would be attacked by those who disagreed with those political extensions. What’s important to remember, though, is that the misuse of scientific concepts, purposefully or ignorantly, when those concepts are brought into the public arena should have no bearing on their underlying scientific validity. Ben-Ari appropriately explains that science is a discipline that strictly imposes self-limitations. “Few people appreciate that modern science is quite limited in scope and restricts itself to description and explanation of natural phenomena; on purpose, science does not deal with *purpose*” (p x).

Ben-Ari deals with the basics of the epistemology of science, how we know what we know, in a straightforward and readable fashion that is fully accessible to the general reader. He covers the importance of falsification, makes critical distinctions between the technical use of terms and the common use of the same words, provides a cursory overview of the use of statistics in science (focusing mostly on medical examples), and offers abbreviated critiques of the sociology of science and post-modern attacks on science. Taken together, all of this allows Ben-Ari to accomplish his main goal of helping readers “distinguish claims that are provisional and debatable, from claims that are so well established that rejecting them drives one over the border that divides real science from *pseudoscience*, which are activities that illegitimately wrap themselves in the mantle of science” (p ix).

The more sophisticated reader, one who is already fairly well immersed in the evolution/creationism controversy, is not likely to find much new in the book.

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Similarly, this is not the book for those looking for specific refutations of creationist assertions about their “discipline” or for ammunition to rebut creationist attacks on evolution beyond those of the “it’s just a theory” genre.

Ben-Ari ends each chapter with a very short vignette of a famous scientist. These interesting but fairly superficial asides are designed to humanize the face of science and to demonstrate that science is always conducted within a cultural and historical context. The twelve people discussed include such notables as Newton, Darwin, Einstein, Pasteur and Pauling, but, unfortunately only one woman, mathematician Emmy Noether, is included.

By covering topics as varied as the nature of reductionism, geology, and the future of science, in addition to the epistemological approaches mentioned above, in such a short book it is not surprising that Ben-Ari is barely able to scratch the surface of any one of them. He has provided the equivalent of a tasty appetizer, one that might be the precursor to an elegant meal. Many readers will likely finish the book ready for the next, more substantial, course — and that’s not a bad thing!

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INTELLIGENT DESIGN AND FUNDAMENTALIST OPPOSITION TO EVOLUTION

by Angus M Gunn
Jefferson (NC): McFarland and
Company, 2006. 215 pages

Reviewed by Charles A Israel

Other than the tantalizing clue of a dedication “To my fellow evangelicals,” Angus Gunn offers little sense of the purpose or intended audience for this short, polemical work. Whether these referenced evangelists are spreading the good news of the Christian gospels or the modern evolutionary synthesis

is not clear, though his book seems to lament the drift of ever more American Christians into anti-evolutionist camps. Evangelical Christian fundamentalists and non-fundamentalists might agree on very little, he asserts, but they “find common ground in their opposition to the theory of evolution” (p 53). How they came to this state, and why that poses a problem for modern America, is the focus of the book.

The major theme of Gunn’s work is “the importance of modern science and the tragedy of fundamentalist rejection of it for such a long time” (p 2). Gunn attacks one side of this problem in the final chapter, offering a few case studies of how biological research has been important in improving “human welfare”. Concentrating on recent advances in genetics and their positive impact on medicine, Gunn also appends a listing of “medical breakthroughs over 100 years” at the end of his book (p 189–90). The role of biological research in these advances is not entirely clear, and it seems that Gunn could have strengthened his case for the plausibility of evolution by examining how human pathogens actually evolve and not just stating that science is finding ways to combat disease.

Perhaps too easily blurring distinctions among “creationists, ... proponents of intelligent design, [and] fundamentalists” (p 3), Gunn nonetheless offers some helpful insights into what unites anti-evolutionists. In less temperate moments he damns them all as “just defending the past” (p 1), but at his best Gunn demonstrates the binding thread of a “common sense” approach to science, theology, and even political philosophy that lies at the heart of an evangelical rejection of evolutionary biology. The problem with such a belief, he notes incisively, is that these claims to inductive study of science or scripture mask the reality that the reader or Baconian scientist are still

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engaged in a process of interpretation. Theological fundamentalists seek to privilege their readings as the most authentic, but their conclusions are no less bound up with their own times and concerns than are those of theological modernists or evolutionary biologists. Gunn seems unwilling to pursue these insights about interpretation into science, boldly claiming, “science is and always has been free from issues of ethics and morality” (p 4), despite the growing literature in the social history of science since Thomas Kuhn’s path-breaking *The Structure of Scientific Revolutions* (1970).

Too often Gunn falls into an approach he criticizes when used by anti-evolutionists; like several chapters in *The Fundamentals*, the early-twentieth-century handbook of theologically conservative Christian thought, Gunn’s book frequently proves more “vitriolic rather than critical” (p 93). He describes evolutionary opponents as practitioners of a “mindless fundamentalism” (p 22) who refuse “to deal rationally” (p 39) with modern science. He even turns on its head the oft-used anti-evolutionist attack linking belief in evolution with the Prussian militarism of World War I or the Nazi atrocities of World War II. Gunn explains the success of George McCready Price’s flood geology with an explicit connection to Adolf Hitler, suggesting that both perpetrated “a big lie” (p 160) with disastrous consequences. I am not suggesting a purity of motive for anti-evolutionists — among other sources, evidence from the 2005 Dover trial demonstrated a clear pattern of deception on the part of several proponents of “intelligent design” — but to equate opponents of naturalistic evolution with a mass murderer of historic proportions is sure to produce more heat than light.

Beyond the excess of vitriol, Gunn’s volume suffers from insufficient background in the admittedly voluminous secondary literature. He asserts that Dayton, site of the 1925 Scopes trial, “was as fundamentalist as any place in America” (p 106), although as Edward Larson has demonstrated, the town was mostly Methodist and had a higher percentage of



non-church members than many surrounding towns (Larson 1997: 92–3). Careless editing leads Gunn to several confusing passages: he covers the same topics in multiple places, at times repeating multiple sentences verbatim (for example on p 120 and 161, on Henry Morris); he seems to regard Stephen Jay Gould as a contemporary of Karl Marx and a precursor to the Russian Revolution (p 103); and he suggests that modern scientists no longer regard “naturalism ... as very important” (p 129).

US President Warren G Harding (1921–23) reportedly remarked “I have no trouble with my enemies, but my damn friends ... they’re the ones that keep me walking the floor nights!” The President was reacting to accusations lodged against several members of his short-lived administration; Harding complained that allegations of wrongdoing by others prevented him from pursuing his agenda. While there is no hint of corruption, malfeasance, or malicious intent in the volume under review, Angus Gunn’s combative approach and inattentive editing might leave defenders of the teaching of evolution in public schools wandering the hallways after dark. In short, it is neither a very effective tool for explaining to evolutionists why fundamentalist Christians cannot accept the central arguments of modern biology nor for converting anti-evolutionists to an understanding of the importance of modern science.

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EVOLUTION VERSUS INTELLIGENT DESIGN: WHY ALL THE FUSS? THE ARGUMENTS FOR BOTH SIDES

by Peter Cook

Sydney (Australia): New Holland Publishers, 2006. 128 pages

Reviewed by Matt Young

Peter Cook, a philosopher with a degree from the University of Sydney, suffers from terminal objectivity — the idea that you have to give equal consideration to both sides of any controversy, whether or not both sides have equal merit. Why all the fuss indeed! There is a fuss because a tiny handful of well-funded activists, few of them scientists, have set themselves up to undermine the theory of evolution and thereby all of science, because evolution does not fit well with their preconceived religious notions. You would not know that from reading this book. Indeed, on page 45, Cook swallows, hook, line, and sinker, the contention that “intelligent design” creationism is not religious in origin because it does not “rule out the possibility that the intelligent designer may in fact be a hyper-intelligent race of aliens from another galaxy!”

Cook’s approach is to present competing factoids so that, as the back cover of the book advises, “You, the reader, can make up your own mind.” No one, layperson or not, can make an informed decision about a highly technical subject like evolution on the basis of a sequence of 100-word factoids.

It does not help that Cook conflates “intelligent design” creationism with creationism in general, as when he notes, incorrectly, that “intelligent design” creationism uses the supposed absence of transitional fossils as evidence against speciation or macroevolution. It also does not help that the book is badly proofread and contains a

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number of annoying factual errors. For example, contrary to Cook, Darwin was unaware of genetic variation and genetic drift. Galileo did not devise the heliocentric theory in 1616 (nor at any other time). Darwin did not publish the *Origin of Species* in 1859 when he “got wind of a similar theory being proposed by fellow naturalist Alfred Wallace”; Darwin and Wallace published jointly in 1858, the year before the *Origin* was published. Design does not necessarily imply purpose. Energy is not exerted; entropy is not lost energy or “spent energy that loses its direction.” The No Free Lunch theorems are not physics. Genesis and the fossil record do not agree. And so on.

Cook writes, “Evolution is a theory in the sense that it is a story about how all past and present life on our planet came to be as it was, and as it now is.” If he thinks that a scientific theory is just a story, then it is no wonder that he cannot choose between evolution and creationism. Cook goes on to say that “scientists are more likely to simply assume the idea of evolution from the outset ...” as if that assumption were an arbitrary choice based on faith. Scientists, he says, could in principle “find data which simply cannot be made to fit with the theory of evolution. This [finding] would imply that the theory of evolution is wrong.” He then argues, correctly but inconsistently, that scientists “constantly” find things they cannot explain but, rather than doubt the theory of evolution, try to explain any apparently anomalous results within the context of the theory. “So,” asks Cook, “is it possible to challenge the validity of the theory of evolution?” The short answer is no, probably not. The theory of evolution is far too well established to be challenged, for example, by a handful of anomalous data or carping criticisms based on tenuous concepts like specified complexity or irreducible complexity.

The structure of the book is like a he said-she said story: “intelligent design” creationism says this; evolution says that. Or sometimes evolution says this; creationism says that. Almost no argument runs longer than one page, and they are mighty small pages at 5 x 7 inches.

Arguments on both sides are presented without comment; readers are left to decide which arguments they prefer, but they are given no guidance whatsoever. For example, Cook repeats uncritically William Dembski's spurious claim that the No Free Lunch (NFL) theorems prove that no search algorithm performs better than a blind search. On the facing page, he notes that evolution has no target and that the NFL theorems do not apply to co-evolution. But he leaves out the crucial fact that Dembski is prevaricating: the NFL theorems do not apply to a single search algorithm in a single environment (that is, a single fitness function) but to the average over all fitness functions. In other words, the NFL theorems are irrelevant to evolution under any conditions, and discussion of a target or coevolution is beside the point.

As a specialist in optics, I was particularly amused by Cook's uncritical repetition of the creationist claim that the parts of the eye are arranged precisely as a human engineer would have arranged them. I do not know about Cook's eye, but mine would be a lot better if the nerves were not on top of the retina. As it is, the nerves have to pass through a hole in the retina, and we can get glaucoma if the tensile force on the nerves gets too great. In addition, if I were designing an eye, I would have made the retina lie on a plane, I would not have designed such a small area of high resolution, and I would have made a lens that did not get stiff and opaque with age. I suppose an automatic exposure control would have been a bit too much to ask for, but at a minimum I would have made the nerves that attach to the rods and cones go to different parts of the brain so that the user could switch rapidly between rods and cones and not have to wait minutes or longer to accommodate to darkness. Nature did what it could with the materials at hand, but, frankly, if I had been around at the appropriate time, I might have made some good suggestions. Cook observes that biochemists sometimes reverse-engineer a system and says they find "design decisions" built into those systems; he uses the

possibility of reverse-engineering as evidence that biochemical systems may have been designed. I certainly hope they are better designed than my eye, but I doubt it. Indeed, I would argue that the existence of demonstrably suboptimal systems militates against a design argument.

Not everything in this little book is bad. But, apart from the errors, Cook's dogged refusal to take a stand is vexing, if not downright irresponsible. Not every question has two sides, and some truth claims are better supported than others. "intelligent design" creationism is bunk and should be treated as such.

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MAMMALS WHO MORPH: THE UNIVERSE TELLS OUR EVOLUTION STORY, BOOK THREE

by Jennifer Morgan
Nevada City (CA): Dawn
Publications, 2006. 48 pages

Reviewed by Lisa M Blank

"Long ago, humans intuited that the Universe had a beginning, and told creation stories the world over. Science now confirms that ancient tradition."

— Jennifer Morgan

Mammals Who Morph is the third and final book in Jennifer Morgan's trilogy for children on the earth's history, preceded by *Born with a Bang* and *From Lava to Life*. As in her previous two accounts, Morgan's chronicle opens with a "Letter from the Universe" in which the reader is invited to follow the universe's life story, as told in first-person by the universe.

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As readers, our time travels begin with "mousy mini-mammals" who "ruled the nights" in a world of giant dinosaurs "who ruled the days"; that is until the great meteor struck the earth 65 million years ago. The mini-mammals then disperse across the land, sea, and air, with some mammals returning to an "easier life" in the seas.

Along the way, Morgan effectively demonstrates the powerful force of co-evolution using an example of the bargain struck between horses and grasses. "Unlike other plants, grass grew from the bottom so it didn't get damaged when the top was eaten ... over time the horses ... had just the right teeth for grinding grass." Hominins enter the story wielding a variety of tools and strategies for survival, capturing the power of fire and sun, and close the story by confronting the current environmental crisis with the "creative powers of the universe that reside within each of us: imagination, love, and decision making."

Throughout the storyline, the universe moves from "crisis to crisis". In each episodic occurrence, Morgan characterizes the crisis as an opportunity for inventiveness and emphasizes how the interconnectedness of all life forms is very much in evidence today. For example, a lightning storm brings fire to the humans; a human's backbone was "fashioned by fish"; the deepest part of the brain was "built by reptiles"; the cells "are directly descended from ancient single cell organisms"; the rotating shoulder was "developed by primates in trees".

Morgan's tale is vividly told and thoughtfully supportive of teachers or parents who plan to use this narrative with their children. Each page contains a timeline of events and in the footer Morgan succinctly captures the science concept or concepts being developed. For example, when she relates how the "morphing of the earth" resulted in the creation of wide-open plains, the science concepts are listed as "Earth cools down and new partnerships form" and a page number links the reader to a more complete scientific explanation of the event. Morgan also provides the reader with a comprehensive list of books, videos, and websites





to use in extending the scientific concepts introduced.

While Morgan's combination of storytelling and science is a compelling format for young readers, it may also prove provocative for some. First Nations readers will likely be troubled by the reference to the peopling of North America via the Bering Strait; their creation narratives do not recognize migration from Asia. Is this a case where Morgan's personification of the universe undermines her effort to advance the reader's scientific way of knowing the world? Will the reader infer then that the theory of evolution is just another story?

As I pondered these questions and how Morgan might respond, I read Morgan's farewell to the reader. Here she explains that "God is purposefully not in the story so that it can be embraced by people of all religious traditions, or of none at all ... people usually refer to "God" as a transcendent, supernatural creator who exists outside the physical world ... today we're rediscovering a sense of divine creativity, not simply in the transcendent mode, but also as immanent, as present in the Universe itself."

While this adieu did not provide an answer to any of my questions, I do know this. In these pages Morgan elegantly captures the richness and wonder of an interdependent and ever changing world where who we are cannot be separated from where we are.

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A JEALOUS GOD: SCIENCE'S CRUSADE AGAINST RELIGION

by Pamela R Winnick
Nashville (TN): Thomas Nelson,
2005. 368 pages

Reviewed by Jeffrey Shallit

Pamela Winnick is an attorney and former reporter for the *Pittsburgh Post-Gazette* who has written several articles that lean

against evolution and in favor of "intelligent design". I recently forced myself to read her 2005 book, *A Jealous God: Science's Crusade Against Religion*. It was not a pleasant experience.

Winnick's book covers a variety of topics: abortion, population control, eugenics, medical experimentation, the Scopes trial, the theory of evolution, "intelligent design", and fetal tissue research. Her thesis — if this rambling, disjointed book can be said to have one — is contained in the book's final paragraph: "The Galileo prototype of the scientist martyred by religion is now purely a myth. Science long ago won its war against religion, not just traditional religion, but any faith in a power outside the human mind. Now it wants more" (p 298).

Throughout the book, scientists are depicted as crazed, power-hungry, and immoral. Only religion, Winnick implies, can rein in these dangerous nuts who threaten society.

Winnick's claim that "science long ago won its war against religion" is far too glib. Ironically, 2005 also saw the publication of Chris Mooney's *The Republican War on Science* (New York: Basic Books, 2005; reviewed in *RNCSE* 2005 May-Aug; 25 [3-4]: 45-6), a far better documented book that shows in depressing detail how American science has been subjugated to the political and especially religious goals of the Christian right.

Winnick's reporting is often sloppy. Incidents are slanted to support her thesis, names are misspelled (Stanislaw Ulam's last name is comically morphed into "Ulsam"; Richard Lewontin's middle initial is given incorrectly), quotes are mined (sometimes incorrectly), and some "facts" are just plain made up (see below).

Here is an example of a mined quote. Winnick claims, "In a 1997 piece in the *New York Times*, Dawkins famously remarked that anyone who does not believe in evolution is 'stupid, and ignorant and ... wicked' (emphasis added)" (p 161). However, Dawkins's actual

remark was "It is absolutely safe to say that if you meet somebody who claims not to believe in evolution, that person is ignorant, stupid or insane (or wicked, but I'd rather not consider that)." Winnick entirely changed the meaning of the quote by replacing Dawkins's "or"s with "and"s. Further, Dawkins's remark did not appear in 1997; it appeared in an April 9, 1989, book review.

As might be expected of someone with no scientific training, Winnick displays multiple misunderstandings of science. In this, she joins several other lawyers who have criticized evolution, such as Phillip Johnson (*Darwin on Trial*), Norman Macbeth (*Darwin Retried*), and Dean Overman (*A Case Against Accident and Self-Organization*). (Oddly enough, the reverse case — evolutionary biologists writing books about law — does not seem to occur.) And despite the fact that Winnick claims to be a "practicing Jew and liberal Democrat", her book uses the same nasty and dishonest rhetorical tricks that are the staple of far-right Christian creationists.

First, let us look at some of Winnick's misunderstandings.

On page 110, Winnick claims that, although evolution cannot be observed, "evolution could be inferred from the rapid variations that occur *within* a given species. During his famed five-year voyage aboard the HMS Beagle, Darwin observed these variations first hand. On a stop in the Galápagos Islands, he noticed the different beak sizes and shapes among the finches that had flown in from the mainland, each settling on a different island" (emphasis in original). Winnick fails to understand that the Galápagos finches are *not* merely variations "within" a species (here she merely echoes a typical creationist objection to evolution), but different species — in fact, thirteen different species in the Galápagos. And of course, evolution *can* be observed, as speciation has been observed in both the laboratory and the wild. How many times can these creationist falsehoods be repeated? Why does Winnick not subject these false claims to some critical scrutiny?

Later on the same page, Winnick writes (in a footnote), “The word ‘theory’ when used in science is different from its ordinary use. A scientific theory is considered virtually the same as fact.” While the first sentence is correct, one can only stare open-mouthed at the ignorance of the second. A theory is *not* the same as a fact; otherwise how could one speak of competing scientific theories? Rather, a theory in the scientific sense is a coherent system of explanation for natural phenomena, testable by experiments, that makes predictions and explains observations. Some theories are better supported than others; only the really well-supported theories, such as gravity and evolution, can be considered as similar to facts, keeping in mind that in science *every* explanation is provisional.

Winnick also claims that “Darwin’s theory was inspired not by science, but by the politics of his time” (p 111). Although it is true that Darwin hit on natural selection by an analogy with Malthus, it is misrepresentation to suggest that his theory was inspired by politics alone. Has Winnick never read the *Origin of Species*? If so, she would have known that Darwin patiently built his scientific case for evolution on a host of supporting facts, not politics. And her history is wrong, too, since Darwin began his transmutation notebook (the “B” notebook) in 1837, but did not make the connection with Malthus’s essay until 1838.

But then, Winnick is no stranger to misrepresentations. In 2001, she claimed, “I am, however, writing a book about the subject showing how the media and scientific elite has stifled meaningful debate on the subject. In doing so, I am indeed supported (\$25 000) by the Phillips Foundation, an organization which takes absolutely no position on the subject of evolution, but which seeks to promote fair and balanced reporting in all subject areas.” However, Wesley Elsberry took a look at the Phillips Foundation web page and found that Winnick’s fellowship was then described as follows: “Project: ‘Examination of How Media and Established Scientists Treat the

Subject of Evolution,’ analyzing why there seems to be little tolerance for teaching creationism in America.” (See <http://www.anti-evolution.org/events/pbsevo/wre_prw_20011129.html> for details.) Since then, the Phillips Foundation has altered its web page and the description of Winnick’s project.

Another creationist trick that Winnick uses is credential inflation. Phillip Johnson, a law professor with no biological training, is described as “brilliant”. Ironically, on page 195, Winnick asks, “how likely was it that Alec Baldwin or Kim Basinger or any of the many other glitzy Hollywood stars had ever seriously studied biology or understood Darwin’s theory of evolution by natural selection or ever read anything on the subject other than PFAW press releases?” Offhand, I’d say it is about the same likelihood that Phillip Johnson or William Dembski or David Berlinski has seriously studied biology, but Winnick does not hesitate to tout *them* as experts.

No creationist saw is too unreliable for Winnick to repeat. Here are a few examples:

A nameless Chinese paleontologist is quoted on page 198 as saying, “In China we can criticize Darwin, but not the government; in America, you can criticize the government, but not Darwin.” Neither Winnick nor others who have used the quote, including Phillip Johnson and Jonathan Wells, have ever identified the paleontologist or provided any corroboration for the anecdote.

On page 122, two brief quotes from mathematicians expressing skepticism about the mathematical feasibility of neo-Darwinism are presented as representing the consensus of the 1966 Wistar Institute Symposium. Winnick says that their dissent was ignored and their objections “faded into oblivion” because of ideological resistance, not considering the possibility that they were mistaken.

Fred Hoyle’s “tornado in a junkyard” objection to current theories of abiogenesis is mentioned on page 172 as if it represented a scientific result rather than his own expression of incredulity and as if no progress had occurred in ori-

gins-of-life research in the 22 years between Hoyle’s comment (in his 1983 book *The Intelligent Universe*) and Winnick’s book.

Liberal Democrat or not, this book cements Pamela Winnick’s reputation as a flack for the Christian right. It is not a fair, reliable, or objective look at the battles between science and religion. It appears to me that Winnick has a bad case of science envy.

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DINOSAURS: THE MOST COMPLETE, UP-TO-DATE ENCYCLOPEDIA FOR DINOSAUR LOVERS OF ALL AGES

by Thomas R Holtz Jr,
illustrated by Luis V Rey
New York: Random House,
2007. 428 pages

Reviewed by Randall B Irmis

There is no shortage of dinosaur books for children, and this is reflected by Tom Holtz’s admonition on the inside flap that “the world doesn’t need another A-to-Z list of dinosaurs.” Typically, dinosaur books are organized by name, vague groupings of creatures, or by time period, rather than any evolutionary or biological theme. Many of these volumes have passable to excellent art, but are light on scientific content, and more informative books are generally inappropriate for children. What, then, does this new book offer over other popular dinosaur books?

The major strength of *Dinosaurs* is that Holtz has done an excellent job explaining dinosaur science as a process; that is, how paleontologists understand the biology of dinosaurs through inferences from the fossil record.

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There are four basic sections of the book: basic principles of dinosaur science; the relationships and major groups of dinosaurs; the evolution of Mesozoic faunas through time; and dinosaur paleobiology; and each is infused with explanations of how science is done. Complex topics are clearly explained in a way that both children and adults will understand. Particularly impressive is that Holtz spends an entire chapter explaining the principles of cladistics, the method by which scientists reconstruct the evolutionary relationships of organisms. Although cladistics is fundamental to modern organismal biology, few popular books (and perhaps no children's books) tackle the subject in any detail, and Holtz should be applauded for taking the plunge. This explanation is also practical for the reader, because Holtz often refers to cladistics in other sections of the book when explaining the relationships of dinosaurs and how scientists make conclusions about dinosaur paleobiology.

Another advantage of this book over others is the inclusion of sidebars written by a variety of dinosaur experts. These short articles cover topics that are not directly discussed in the main text, including dinosaur growth, diseases, and feeding. Not only do these sidebars broaden the topics discussed in the book, but also they introduce a diversity of opinions and information that wouldn't be possible with a single author. The quality of these contributions varies (some are more informative than others), but they are superb overall and put the book on a level above most other children's dinosaur books.

Dinosaurs may not be the first book that I'd reach for to teach children about evolution, but it does an excellent job integrating the principles of evolution and natural selection into the discussion of dinosaur topics. Evolution is used to explain how we know the relationships of dinosaurs, provide hypotheses about dinosaur behavior, and explain why different growth strategies might be beneficial. Holtz's introductory chapter on evolution is short, but it effectively

communicates the basic principles of natural selection and concepts like the evolutionary tree of life.

This is one of the best popular dinosaur books I've read. Although focused for children, it will also be informative for students and adults. The book is packed with up-to-date and clearly explained information, and the author maintains a website for future updates (<<http://www.geol.umd.edu/~tholtz/dinoappendix/>>). Given the information content, clear explanations, full-color semi-glossy printing, and hardback binding, this book is an excellent value at the list price of \$34.99.

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THE VOYAGE OF THE BEETLE: A JOURNEY AROUND THE WORLD WITH CHARLES DARWIN AND THE SEARCH FOR THE SOLUTION TO THE MYSTERY OF MYSTERIES, AS NARRATED BY ROSIE, AN ARTICULATE BEETLE

by Anne H Weaver
illustrated by George Lawrence
Albuquerque (NM): University of
New Mexico Press, 2007. 80 pages

Reviewed by Jason R Wiles

Its title easily recognizable as a play on that of Darwin's own volume, Anne Weaver's *The Voyage of the Beetle* is a fanciful account of the historic circumnavigation from the perspective of Rosie, another passenger on the *Beagle* who happens to be a rose chafer beetle (*Cetonia aurata*).

Those acquainted with books on evolution for young readers will probably, and fondly, recall *The Sandwalk Adventures* (2003), Jay Hosler's delightful graphic novel in which Darwin is similarly associated with a storytelling arthropod. And while the subject matter and

the intended age level may overlap, there are marked differences between these two works. For example, in *Sandwalk*, Mara, a young follicle mite and resident of Darwin's left eyebrow, is unfailingly respectful to Darwin, calling him "sir" while she wrestles with his insistence that he is not, as she has always believed, an all-powerful god called "Flycatcher", an allusion to his moniker among the *Beagle's* crew. Mara listens raptly as Darwin explains his theory of natural selection and debunks misconceptions about evolution such as, for example, that individuals (rather than populations) evolve — a misconception retained in Weaver's definition of adaptation in *Beetle's* glossary, which suggests, erroneously, that adaptation in animals is achieved "by learning".

Rosie contrasts starkly with Hosler's reverent Mara. She has been a constant, though independent, companion of Darwin since the young naturalist discovered her under a rock, and she rather familiarly calls him Charles — which she prefers over his "silly nickname of Gas." Fortunately, Rosie followed a most unbeetlelike whim in her decision to forsake a comfortable life among England's rosebuds to join Darwin in his travels. Otherwise he might never have discovered his solution — descent with modification via natural selection — to "the mystery of mysteries", the origin of new species.

Darwin is already pondering questions about the diversity of life as the story begins, sometime before the *Beagle's* embarkation. Even at this point, Rosie hints that she was aware of the workings of evolution, since "beetles have been around for more than 200 million years" and thus "have an ancient and unique vantage point when it comes to the mysteries of nature."

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However, describing Charles as resistant to suggestions or advice, Rosie decides to guide him toward a solution, challenging the reader to figure it out before Darwin.

Recounting the five-year voyage, Rosie colorfully describes several members of the ship's crew and a few particulars of life at sea, which, to say the least, was uncomfortable for Darwin. Although she portrays him as "a restless and irritable cabin mate," Rosie sympathizes with Darwin over the cramped conditions and his seasickness. She also commends him for faithfully recording and sketching countless and amazing species of microscopic creatures collected via plankton nets, and admires his enthusiasm for such discoveries. At this point, however, our coleopteran narrator turns to well-intended subterfuge, covertly scribbling clues into Darwin's notebook in hopes that she can lead him toward the answer to "the mystery of mysteries".

Rosie's clues are drawn from their encounters with the organisms and environments of South America, the Galápagos, and a few stops in the southern Pacific. They essentially comprise the basic tenets of Darwin's theory (variation exists among individuals of a species; some individuals have traits which give them advantages in the struggle for life; those that survive pass on their traits to offspring) as well as observations about geologic change, comparisons between extinct and extant organisms, and the inference that the diversity of living things has changed over time.

After their return to England, Rosie explains, she "continued to accompany Charles on long walks" where she listened and waited for him to figure out what all the clues meant, and she lists them again for the reader to ponder. A solution is offered in the final chapter which condenses Darwin's theory and a few supporting concepts in a scant three pages.

Although Darwin is often portrayed in *Beetle* as fussy, clumsy, and at times obstinate, he is more often described as insatiably curious, brilliant, and congenial. In the afterword, Weaver explains, "the comical incidents included in this

book were chosen to show that Darwin was open to new experiences and able to laugh at himself." Indeed, the book does paint Darwin as likeable, as do the wonderful illustrations by George Lawrence, which refreshingly portray a youthful and spry Darwin with locks of "fly-away red hair" rather than the wizened old sage of Down.

Sundry references to Darwin's training in theology (curiously defined in the glossary as being specific to Christianity) and associations with missionaries on his travels are no doubt intended, and may well help, to make him and the book more palatable to potentially wary Christians. Rosie describes Darwin as a loving husband and father as well as having a deep and caring respect for others. Noting his vehement opposition to slavery, she explains that he had been "much grieved by the misery" of the slaves and that such cruelty was "a mystery that even Charles could not fathom."

Such efforts to depict Darwin as the genius and grand human figure that he was, and such efforts to acquaint young readers with evolution and natural selection, will always get my nod of approval, even if a number of errors detracted from my enjoyment. (For example, spiders are included among Rosie's "insect companions"; a tsunami is called a "tidal wave"; Darwin is described as the *Beagle's* naturalist — a legend that Stephen Jay Gould [1977] was fond of dispelling.) And *Beetle* is such an attractive book that it is sure to catch the attention of youngsters. I'd like to see *Beetle* in the hands of children of the appropriate age, especially if they have knowledgeable parents and teachers nearby to shore up the details, catch misconceptions, and answer the questions that are sure to arise. As Weaver aptly states, "one mystery leads to another."

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GOD AND EVOLUTION: A READER

edited by Mary Kathleen
Cunningham
New York: Routledge, 2007.
385 pages

Reviewed by James F McGrath

Mary Kathleen Cunningham's reader *God and Evolution* provides an up-to-date collection of key excerpts from the most important representatives of various positions and viewpoints on this subject. Each section begins with an introduction that helps guide the reader to important similarities and differences between the selections, filling in useful background knowledge that makes the readings themselves more accessible.

The first part, on methodology, is focused primarily on method in theology, with a consideration of how language and method in theology relate to language and method in science. This section would have benefited from the inclusion of a discussion of what science is, and how it works, written by a philosopher of science or a biologist who was not specifically concerned to make a comparison with religion. Nevertheless, what is included is extremely helpful. The excerpt from the nineteenth-century Protestant theologian Charles Hodge illustrates that, when Christian fundamentalism first developed, it did not regard a young earth as one of the fundamentals that gave the movement its name. The other excerpts in this section are by Sallie McFague, Mary Midgley, and Ian Barbour, and reflect a more mainstream approach to religious language and theology.

Part two presents evolutionary

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theory, with excerpts from Darwin's *Origin of Species* as well as works by Francisco Ayala and Michael Ruse. The latter are appropriate choices, since these individuals illustrate that a Christian can be a prominent evolutionary biologist, and that an atheist philosopher of science can see no inherent incompatibility of evolution and Christianity. Both Ayala and Ruse distinguish between the fact of evolution, the path of evolutionary development down the ages, and the mechanisms that drive evolution. The distinctions are important ones that are often overlooked when people discuss evolution in theological contexts.

The third part, entitled simply "Creationism", is rather more problematic. It consists of only two readings. The first is simply the first two chapters of Genesis. It was a good choice to use the New Revised Standard Version translation, which neither presupposes that the creation described was a creation out of nothing (the Hebrew in Genesis 1:1 is ambiguous on this point), nor tries to cover up elements of a pre-scientific worldview such as the dome of the sky. Yet it would have been appropriate to provide an example of scholarly treatment of these chapters, showing that the order of the days has more to do with parallelism than chronology, that there in fact seem to be two creation stories in these chapters, and so on. Without such analysis of the Bible itself, it is that much harder to get young-earth creationists over the hurdles that keep them from accepting evolution. It might also have been useful to include here something written by a young-earth creationist author. Nothing is more effective in persuading students of the bankruptcy of the young-earth creationist approach than allowing them to read what they themselves have to say, coupled with insightful scientific and theological analysis of their arguments by people like Kenneth R Miller. Nevertheless, the second reading in this section, a historical overview of young-earth creationism by Ronald Numbers, is very helpful.

Part four deals with "intelligent design", beginning with William Paley's famous argument. The

chapter by Michael Behe makes the case for "intelligent design" as well as it possibly can be made, with the result that Miller's response in the chapter that follows becomes all the more effective, showing how much of the evidence Behe says would disprove his claims actually exists.

Part five presents proponents and critics of forms of metaphysical naturalism based on evolution. The excerpts from Richard Dawkins and Daniel C Dennett are excellent examples of their views and of their delightful writing style. Mary Midgley's short piece points out that Darwin himself denied that natural selection is an all-encompassing explanation in biological change over time, much less in economics and other areas. Another (very short) excerpt from Ruse rounds off this section.

Part six is entitled "Evolutionary Theism" and presents a diverse group of theologians united in their acceptance of evolution and their openness to incorporating the relevant scientific data into their theological reflections. Howard Van Till points out a number of ironies that typify both extremes in many discussions of this subject. Arthur Peacocke's piece nicely complicates the oversimplified view that many have of the relationship between Darwin's theory and faith, pointing out that initially there were many in the religious community who embraced evolution, just as many in the scientific community were exceedingly skeptical. Jürgen Moltmann's contribution is an example of the wonderfully creative and exciting theological thinking that he has offered on the subject of creation. The section's final piece by Elizabeth Johnson complements the others, discussing concepts such as that of the soul and incorporating a number of important quotations by a variety of theologians and scientists.

I am puzzled by the editor's decision to place an excerpt by John Haught in the seventh part, "Reformulations of Tradition". Haught represents a Roman Catholic theological outlook very much in line with those offered in part six — indeed, Haught draws heavily on Moltmann's ideas in places, and is, like Peacocke, a

panentheist. The other pieces in this section — by Sallie McFague, Ruth Page, and Gordon Kaufman — sit more comfortably under the rubric of "revisionists". McFague explores the idea of the universe as God's body, combining a number of already-existing models in innovative and creative ways. Page suggests that it is more appropriate to speak of God being with everything than in everything in what may perhaps be the least helpful excerpt in the collection, since Page seems to conflate the idea of everything existing in God (pantheism) with the idea that God is in everything. Finally, Kaufman suggests that it is more appropriate to think of God as creativity rather than creator in the context of our current state of scientific knowledge.

On the whole, *God and Evolution* is a useful reader, although some examples of non-Western perspectives might have made the diversity of the book richer still. Quibbles about what was and was not included aside, for most American readers with some background in or contact with conservative Christianity of an anti-evolutionary sort, this book will provide helpful information that will enable readers to understand what is at stake and navigate the current debates over God and evolution in a more well-informed manner.

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[For a longer version of this review, visit <http://exploringourmatrix.blogspot.com/2007/11/review-of-god-and-evolution.html>.]



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