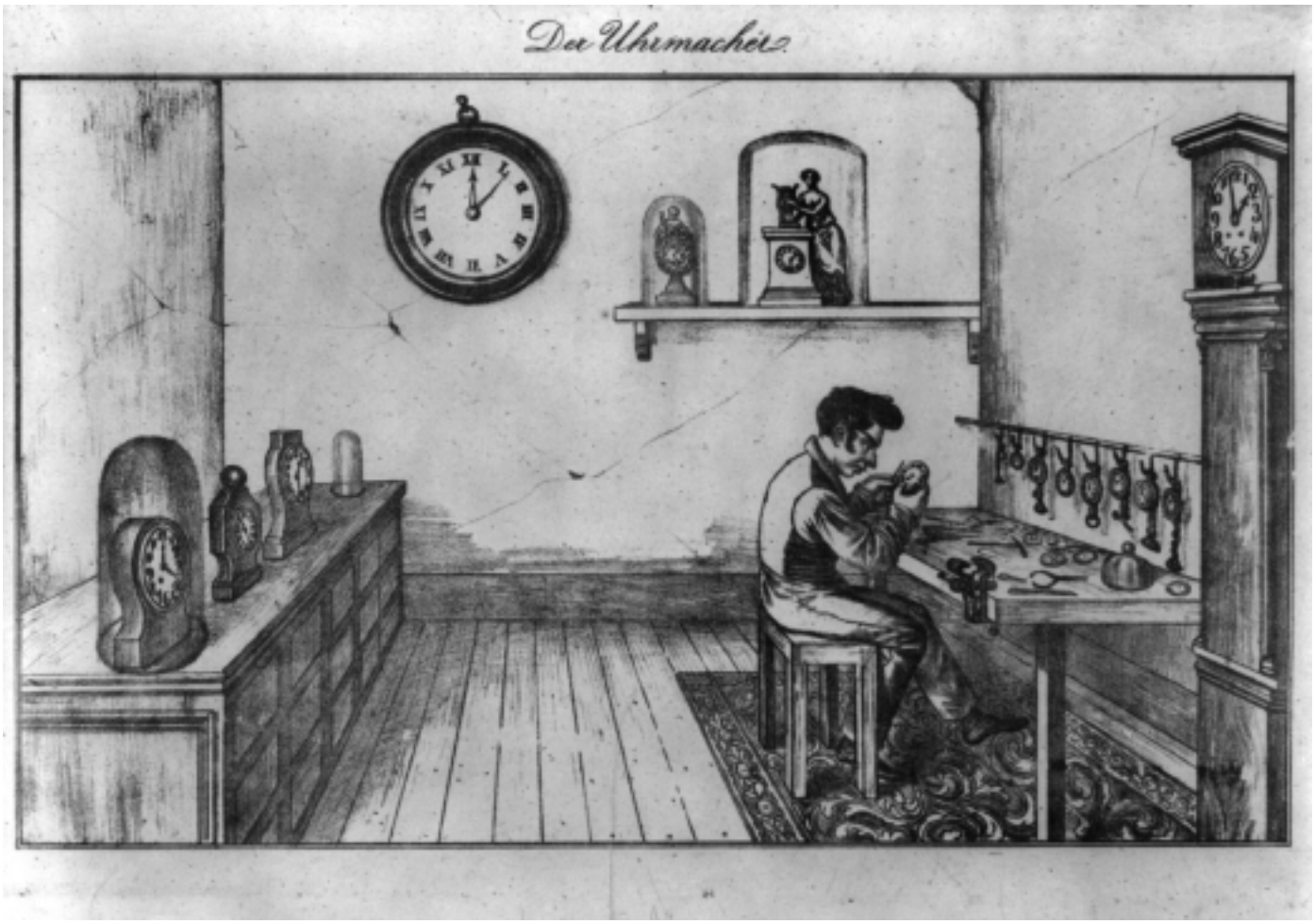
NCSE

REPORTS OF THE NATIONAL CENTER FOR SCIENCE EDUCATION

DEFENDING THE TEACHING OF EVOLUTION IN THE PUBLIC SCHOOLS

Volume 29, Number 4 JUL-AUG, 2009

CONTINUES *NCSE REPORTS & CREATION/EVOLUTION*



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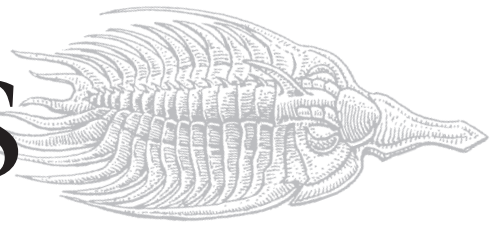

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Cover: Der Uhrmacher, from Oertels Lesebuch, circa 1840–1890. Courtesy of the Library of Congress, LC-USZ62-14510.

In 1995, as I prepared to assume duties as editor of the erstwhile *NCSE Reports*, my first official act was to rename this column — formerly known as "From the Editor's Desk". This move was in no small part to the influence of Walter Cronkite, as I was reminded when I read of his death as I was finishing this column for the current issue. It seemed that the CBS news staff favored my small undergraduate college for their sons and daughters, and among the anecdotes that I remember some 40 years later is Cronkite's response to those preprinted memo pads that began "From the Desk of …". Cronkite refused to answer notes on such stationery, responding (the story goes), "I do not correspond with office furniture." And that is why for the past 14 years you have been reading notes "from the editor" and not "from the editor's *desk*"!

Our current issue takes a look at "intelligent design" creationism. We begin the features section with an interview of Mark Perakh by Glenn Branch. Perakh describes how he became interested in ID, the results of his investigations into its propositions and conclusions, and his ultimate rejection of ID as a productive, competing paradigm in the sciences.

Despite this failed scientific track record, ID persists. Norman Sleep and Lawrence S Lerner examine the historical and philosophical roots of modern "intelligent design" creationism. Sleep's review of William Paley's *Natural Theology* in the context of the contemporary state of knowledge in geology, natural history, and other scientific fields argues that Paley would be more comfortable in the 21st century with evolutionary scientists than with ID proponents — in spite of his arguments for a designer in the early 19th century. Lerner examines the evolution of ID creationism and finds threads of other discarded concepts — those of purposeful change that were replaced as improving knowledge about biological change allowed the construction of more reliable analytical and heuristic models. In light of ID's failure to produce any compelling alternative, what, asks Lerner, are its options?

And in his special column on the people and places of evolution, Randy Moore also focuses on William Paley. Moore looks at the various uses of timekeeping devices as metaphors for the natural order.

IN THE NEWS

In our Updates section, we see that most anti-evolution bills across the country have died as legislative sessions come to a close. One of the remarkable things is how often the sponsor of an anti-evolution bill in any particular session has sponsored multiple bills previously. This history provides an interesting genealogy of the bills and the anti-evolutionary strategies in vogue at the time of their introduction. While it is not as undeniable as the case of "cdesign proponentsists" (<http://ncseweb.org/creationism/legal/cdesign-proponentsists>), it makes clear the link between the latest catchphrase and the intellectual history of anti-evolutionism.

We also report on a Public Religion Research survey of mainline Protestant clergy in the US. Over half reject teaching creationism alongside evolution in public schools. Differences from the consensus follow predictable doctrinal grounds.

The news from NCSE shows our members are better than ever. They keep up a steady stream of pro-evolution activity — including scientific research — and also a steady stream of financial support. We gratefully acknowledge both. We also bring readers another report of NCSE's "Friend of Darwin" Awards, conferred for extraordinary service in promoting evolution and the public understanding of science.

BOOK REVIEWS

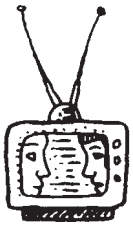
We begin the book reviews section with an extended review essay by John Timmer on the Discovery Institute's so-called inquiry-based textbook, *Explore Evolution*. This is excerpted from a much longer essay on Timmer's blog on arstechnica.com. Our other reviews focus specifically on books that explore ID or that examine the impact of ID on contemporary society.

RNCSE 29(4) was printed in August 2009.

NEWS

Darwin Year in the Netherlands: A Time to Reflect

Coen Brummer



Two hundred years ago in February, Charles Darwin was born in Shrewsbury, a small English village about 65 miles from Liverpool. This November, it will be 150 years since the publication of *On the Origin of Species*, Darwin's magnum opus. For the first time in history, humanity was provided with a reasonable and scientific answer on questions concerning human origins and development. It is no surprise that "Darwin Year 2009" has been celebrated at universities around the world.

However, this Darwin year inspires us to more activities than simply throwing a party for the achievements of human intellect. One of them is reflection on the debate that Darwin's theory started back in the nineteenth century, and which is still going on to this day. In this article, I will give a brief sketch of the situation in the Netherlands over the last few years. While there is no serious scientific doubt about the fundamentals of the theory of evolution among academics in the Netherlands, things look quite different in mainstream society. Recent studies, as published in *Science* (Miller and others 2006) and in the Dutch popular scientific magazine *Quest* (as reported in *De Volkskrant* 2008 Nov 13; available on-line at <http://www.volkskrant.nl/binnenland/article1091241.ece/44_van_100_Nederlanders_gelooft_in_leven_na_de_dood>), show that the rate of acceptance of scientific theories in the Netherlands is low compared to the rest of Europe. Perhaps because of this, there were some controversies concerning evolution during the last decade, which received considerable media attention.

On March 2, 2005, Maria van der Hoeven, at that time the Dutch Minister of Education, Culture, and Science, stated on her website's blog that she was fascinated by the concept of "intelligent design" (ID). (See this report [in Dutch] from Kennislink 2005 Jun 9; available on-line at <http://www.kennislink.nl/publicaties/minister-ontvangt-boek-over-id>). Van der Hoeven, a member of the Christian Democratic Party with no scientific background whatsoever, told her staff to investigate whether ID could be used in secondary school to "build bridges" between people with different life stances. Scientists from all over the country were furious. Ronald Plasterk, a prize-winning molecular geneticist, columnist, and coincidentally the *current* Minister of Education, Culture, and Science, wrote in a column: "When van der Hoeven as a citizen feels the need for a talk about the creator she is free to join a conversation club. As a minister [of government], she should focus on her task and that is to guarantee the quality of education. No more, no less" (2005 May 8; my translation; the original Dutch is available on-line at <http://www.vpro.nl/gramma/buitenhof/afleveringen/22038179/items/22323895/>). The secular parties in the House of Representatives raised their voices as well. After this storm of protest, van der Hoeven was forced to withdraw her plans.

The next controversial affair had its roots in the way the public broadcasting network is organized in the Netherlands. Until the late 1960s, society in the Netherlands was segregated into "pillars". This phenomenon — pillarization — made it possible for people of various "life stances" to live separated from each other. Marriage, newspapers, broadcasting networks, and labor unions were all organized within one's own pillar. Currently, the Dutch broadcasting network, as a legacy of pillarization, is still divided into Catholic, Protestant, and Social Democratic organizations, each with its own television shows and radio stations.

In July 2007 a scandal came to light. The *Evangelische Omroep* — the Evangelical Network — was broadcasting the BBC's *The Life of Mammals,* a natural history program produced by David Attenborough. While the original DVD contains ten episodes, the evangelicals broadcast only nine, leaving out the last episode — the one on the origin and evolution of humans. In the other episodes, scenes that mentioned evolution or the age of the earth were cut as well. Two evolutionary biologists, Gerdien de Jong (Utrecht University) and Hans Roskam (Institute of Biology Leiden), started a petition to discourage the use of BBC material to mislead viewers of natural history programs in the future. (This is discussed at The Panda's Thumb blog: 2007 Oct 1; <http://pandasthumb.org/archives/2007/10/dutch-petition.html>.) They presented the petition to the BBC and David Attenborough, who, by the way, reacted quite mildly.

When asked about the situation by NOS Headlines, a Dutch news website, EO director Hans Hagoort said he "did not understand the drama": "since the start of the EO," he said, "we have been broadcasting natural history programs, including the ones from the BBC." When asked about the deleted scenes, he answered, "we edit the series to fit the Christian faith; we have been doing it for years. We

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made good arrangements with the BBC about it." De Jong objected. 'They should broadcast the complete series, or not broadcast it at all" (2007 Jul 28; my translation; the original Dutch is available on-line at <http://headlines.nos.nl/forum.php/list_messages/7478>).

The third event took place on Darwin's birthday, February 12, 2009. Three months earlier, an impressive list of Dutch orthodox Christian organizations joined forces in a campaign against the theory of evolution. Groups such as *Schreeuw om leven* ("Cry for Life") and *Bijbel en onderwijs* ("Bible and Education") announced in the national media their plan to send leaflets to six million households in the Netherlands on Darwin's birthday. The total number of households in the Netherlands is estimated at roughly seven million.

The leaflet that was distributed defended creationism as true and opposed to evolutionary science. "You have a choice. You can believe what evolution tells you about the history and origin of man, or you can follow the Bible." The eight-page leaflet was filled with pictures and stories that are used in American creationist brochures as well: natural selection would only lead to decay and disease and not to new or enhanced functions in organisms; fossilized trees that are upside down in the earth indicate a mass flood; and so on. Needless to say, none of the initiators of this campaign had a background in evolutionary biology or geology. The committee of recommendation contained numerous scholars of theology, some priests and churchmen, but not one scientist with a decent academic career. It is unclear how many leaflets were spread in the end. However, the size of this campaign marked a new chapter in the history of creationism in the Netherlands.

These three examples by no means provide a full account of what is going on in the Netherlands. Still, at least one conclusion can be drawn from them. While the Netherlands do not have such a tradition of anti-scientific creationism as the United States has had since the Scopes Trial, public comprehension of evolution is still low and the academic world should remain aware of this. In this Darwin year, 150 years after the publication of *On the Origin of Species*, scientists cannot yet rest on their laurels.

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Mainline Protestant Clergy on Evolution

A recent study of mainline Protestant clergy conducted by Public Religion Research included a few questions about evolution. According to the report of the survey:

> Mainline clergy views of evolution and its place in public school curriculum are complex. On the one hand, the majority of mainline clergy (54%) do not support the teaching of creationism alongside evolution in public school biology classes. On the other hand, mainline clergy are more evenly divided in their views about the theory of evolution itself. Forty-four percent of mainline ministers say that evolution is the best explanation for the origins of life on earth, and a similar number disagrees (43%). United Methodist clergy and American Baptist clergy are most likely to disagree. [Seven in ten] American Baptist clergy (70%) and a majority (53%) of United Methodist clergy say that evolution is not the best explanation for the origins of life on earth.

To provide the details, when asked if creationism should be taught alongside evolution in public school biology classes, 15% of the respondents strongly agreed, 21% agreed, 10% were not sure, 19% disagreed, and 35% strongly disagreed. When asked if evolution is the best explanation for the origins of life on earth, 13% of the respondents strongly agreed, 31% agreed, 13% were unsure, 20% disagreed, and 23% strongly disagreed.

In any case, the respondents were generally not outspoken about their views: only 3% of the respondents indicated that they very often expressed their views about teaching about evolution in public schools in the last year and only 13% indicated that they often did so; 42% indicated that they seldom did so and 42% indicated that they never did so.

The respondents were clergy from each of the seven largest mainline Protestant denominations: the United Methodist Church, the Evangelical Lutheran Church in America, the American Baptist Churches USA, the Presbyterian Church (USA), the Episcopal Church, the United Church of Christ, and the Christian Church (Disciples of Christ). The survey was conducted by mail between March 3 and September 15, 2008.

For further details, visit <http://www.publicreligion.org/research/?id=167>.

UPDATES

Alabama: When the Alabama legislative session ended on May 15, 2009, House Bill 300, the so-called Academic Freedom Act, died in committee. If enacted, HB 300 would have purportedly protected "the right of teachers identified by the United States Supreme Court in *Edwards v Aguillard* to present scientific critiques of prevailing scientific theories" and "the right of students to hold a position on views [*sic*]." Previous similar anti-evolution bills in Alabama — HB 923 in 2008; HB 106 and SB 45 in 2006; HB 352, SB 240, and HB 716 in 2005; HB 391 and SB 336 in 2004 — failed to pass. In 2004, a cosponsor of SB 336 told the *Montgomery Advertiser* (2004 Feb 18), "This bill will level the playing field because it allows a teacher to bring forward the biblical creation story of humankind." (For background, see *RNCSE* 2009 Mar/Apr; 29 [2]: 14–20.)

Missouri: When the Missouri legislative session ended on May 15, 2009, House Bill 656 died, without ever having been assigned to a committee. If enacted, HB 656 would have required state and local education administrators to permit teachers to "help students understand, analyze, critique, and review in an objective manner the scientific strengths and scientific weaknesses of theories of biological and chemical evolution." Otherwise a typical instance of the recent spate of anti-evolution "academic freedom" bills, HB 656 was interestingly expansive about what it was not intended to do:

> This section shall not be construed to promote philosophical naturalism or biblical theology, promote natural cause or intelligent cause, promote undirected change or purposeful design, promote atheistic or theistic belief, promote discrimination for or against a particular set of religious beliefs or ideas, or promote discrimination for or against religion or nonreligion. Scientific information includes physical evidence and logical inferences based upon evidence.

(For background, see *RNCSE* 2009 Mar/Apr; 29 [2]: 14–20.)

The chief sponsor of HB 656 was Robert Wayne Cooper (R–District 155), joined by Mike Sutherland (R–District 99), Ed Emery (R–District 126), Therese Sander (R–District 22), Brian Nieves (R–District 98), and Stanley Cox (R–District 118). Cooper was the sponsor of numerous failed anti-evolution bills in the past. In 2008, he introduced the similar HB 2554. In 2006, he introduced HB 1266, which if enacted would have required that "If a theory or hypothesis of biological origins is taught, a critical analysis of such theory or hypothesis shall be taught in a substantive amount." In 2004, he introduced two bills, HB 911 and HB 1722, that called for equal time for "intelligent design" in Missouri's public schools. HB 911 moreover contained idiosyncratic definitions of various scientific and philosophical terms as well as the draconian provision, "Willful neglect of any elementary or secondary school superintendent, principal, or teacher to observe and carry out the requirements of this section shall be cause for termination of his or her contract."

Ohio, Mount Vernon: "John Freshwater, an eighth-grade science teacher facing dismissal for allegedly preaching in the classroom, is suing the Mount Vernon City School District, saying it violated his constitutional and civil rights," the *Columbus Dispatch* (2009 Jun 11) reported. Freshwater was himself sued in federal court in June 2008 for allegedly inappropriately bringing his religion into school — including by posting posters with the Ten Commandments and Bible verses in his classroom, branding crosses into the arms of his students with a high-voltage electrical device, and teaching creationism. The Mount Vernon City School District Board of Education quickly voted to begin proceedings to terminate his employment with the district, and administrative hearings have been proceeding intermittently since October 2008. (Detailed reports on the hearings by Richard B Hoppe are available on The Panda's Thumb blog [<http://www.pandasthumb.org>; search for "Freshwater"].)

In his lawsuit, Freshwater names as defendants the board, two individual board members and four other district administrators, a investigative firm and two of its employees commissioned by the district to investigate his teaching, and up to eight unknown (even to him) "employees, agents or others associated" with the board who may have "conducted or facilitated" actions against him. The suit contains sixteen counts, including religious discrimination, defamation, conspiracy and breach of contract, and seeks $500 000 in compensatory damages and $500 000 in punitive damages. Documents associated with the case, *Freshwater v Mount Vernon City School District Board of Education et al*, are available on the "Creationism and the Law" section of NCSE's website, as are documents associated with the suit against Freshwater, *Doe et al v Mount Vernon City School District Board of Education et al.* (For background, see *RNCSE* 2008 Mar/Apr; 28 [2]: 16–8; 2008 May/Jun; 28 [3]: 5–10; and 2008 Jul/Aug 28 [4]: 11–4.)

Oklahoma: With the adjournment of the Oklahoma House of Representatives on May 22, 2009, and the adjournment of the legislature altogether on May 25, 2009, House Resolutions 1014 and 1015, attacking Richard Dawkins, are dead. Both measures, if adopted, would have expressed the strong opposition of the Oklahoma House of Representatives to "the invitation to speak on the campus of the University of Oklahoma to Richard Dawkins of Oxford University, whose published statements on the theory of evolution and opinion about those who do not believe in the theory are contrary and offensive to the views

and opinions of most citizens of Oklahoma." Both measures were introduced shortly before Dawkins spoke at the University of Oklahoma on March 6, 2009, as part of the university's celebrations of the Darwin anniversaries. (For background, see *RNCSE* 2009 May/Jun; 29 [3]: 15–22, 27–9.)

The sole sponsor of both resolutions was Todd Thomsen (R–District 25). But Thomsen was not the only legislator concerned about Dawkins's visit. The *Tulsa World* reported (2009 Mar 30), "Rep Rebecca Hamilton, D–Oklahoma City, filed a lengthy open records request with the university, asking for any correspondence regarding Dawkins's speech, information on any costs to OU, a list of any money Dawkins received and who provided the funds, and any other 'pertinent financial information'." In fact, Dawkins waived his speaking fee for the event and additionally announced during his talk that the Richard Dawkins Foundation for Reason and Science would be donating $5000 to Oklahomans for Excellence in Science Education.

The *Muskogee Phoenix* (2009 Apr 2) editorially commented, "You don't have to be a rocket scientist to figure out Thomsen and Hamilton are not concerned about free speech. They are concerned only about promoting their particular point of view and satisfying what they see as the majority view on religion," adding, "our state has legislators complaining about the infringement of free speech while they promote [such infringement] at the same time." Similarly, Piers Hale, a historian of science at the University of Oklahoma, told the university's student newspaper, the *Oklahoma Daily* (2009 Apr 3), "I find it deeply [troubling] that elected state officials appear to be using the powers of their offices to attempt to censor the opinions of those with whom they personally disagree."

South Carolina: Senate Bill 873, introduced in the South Carolina Senate on May 21, 2009 and referred to the Senate Committee on Education, would, if enacted, require the state board of education to "examine all curriculum in use in this state that purports to teach students about the origins of mankind to determine whether the curriculum maintains neutrality toward religion." The bill further provides, "Related to non-religion, the examination must include a review as to whether the curriculum contains a sense of affirmatively opposing or showing hostility to religion, thus preferring those who believe in no religion over those who hold religious beliefs." The first year of the current two-year legislative session ended on May 21, 2009, so S 873 is not likely to be considered until the second year begins in 2010.

S 873 was introduced by Senator Michael Fair (R–District 6), who spearheaded a number of previous anti-evolution efforts in South Carolina. In 2003, he sought to establish a committee to "determine whether alternatives to evolution as the origin of species should be offered in schools." The *Greenville News* (2003 May 1), reported that Fair "said his intention is to show that Intelligent Design is a viable scientific alternative that should be taught in the public schools." In 2005, he introduced a bill modeled on the so-called Santorum language often misrepresented as contained in the federal No Child Left Behind Act of 2001. The bill failed, but Fair won himself a description as "the dominant voice advocating for SC schools to teach more than Charles Darwin's theories of evolution," according to *The State* (2005 Jun 17). In 2008, he introduced a version of the "academic freedom" anti-evolution bill, which died in committee.

Texas: The Texas Senate voted not to confirm Don McLeroy in his post as chair of the Texas state board of education on May 28, 2009. Although the vote to confirm him was 19–11, a two-thirds approval was required. The *San Antonio Express-News* (2009 May 28) explained, "The Senate seldom rejects gubernatorial appointments. The Senate's blocking of McLeroy will force Gov Rick Perry to appoint a new board leader. McLeroy will keep his spot as a board member."

McLeroy's confirmation was editorially opposed by a number of Texas newspapers, including the *San Antonio Express-News* (2009 May 3), which wrote, "McLeroy has demonstrated he is unfit to lead a body that crafts public education policy for this great state," and the *Austin American-Statesman* (2009 May 8), which described his tenure as chair as "disastrous," while cautioning, "Simply removing McLeroy, a dentist, from the chairmanship won't be enough to bring sanity" to the board.

A major concern of the senators voting against McLeroy's confirmation was his attempts to undermine the treatment of evolution in the state science standards. Eliot Shapleigh (D–District 29), for example, questioned his endorsement of a book that describes parents who want their kids to learn about evolution as "monsters," scientists as "atheists," and clergy who see no conflict between science and faith as "morons". McLeroy is, notoriously, a creationist himself, as the *Austin American-Statesman* (2009 Mar 8) described in detail.

In a statement dated May 28, 2009 (available on-line at <http://tfnblog.wordpress.com/2009/05/28/tfn-statement-on-senates-mcleroy-vote/>, Kathy Miller of the Texas Freedom Network commented, "We had hoped that the Legislature would take more action to put this train back on the tracks, but clearly new leadership on the board was a needed first step. The governor should know that parents will be watching closely to see whether he chooses a new chairman who puts the education of their children ahead of personal and political agendas."

Earlier, the *Houston Chronicle* (2009 May 25) reported speculation that Perry might elevate Cynthia Dunbar to replace McLeroy. The newspaper added, "Like McLeroy, Dunbar also holds strong Christian beliefs and recently authored a book that advocates more religion in the public square."

But on July 10, 2009, Perry named Gail Lowe to replace McLeroy. The *Dallas Morning News* (2009 Jul 11) noted:

> Lowe is one of seven Republicans who make up the board's social conservative bloc, which frequently has clashed with Democrats and moderate Republicans. The most recent disagree-

NCSE NEWS

News from the Membership

Glenn Branch

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!

Responding to the *Augusta Chronicle*'s editorial (2009 Feb 7) expressing dismay at the outrage caused by the University of Vermont's asking Ben Stein to speak at its commencement (see *RNCSE* 2009 May/June; 29 [3]: 15–22, 27–9), **Richard Baxter** explained that the outrage was due to Stein's role in the creationist propaganda film *Expelled: No Intelligence Allowed*, and cited the consensus of film critics, **Kenneth R Miller**'s op-ed in the *Boston Globe*, and NCSE's *Expelled* Exposed website as evidence of the movie's general wretchedness. His letter appeared in the February 14, 2009, issue of the newspaper.

Glenn Branch

NCSE deputy director **Glenn Branch** contributed a review of *Back to Darwin: A Richer Account of Evolution* (Grand Rapids [MI]: William B Eerdmans, 2008; reviewed in *RNCSE* 2009 Mar/Apr; 29 [2]: 45–6), edited by John B Cobb Jr, to *Philosophy in Review / Comptes rendus philosophiques* (2009; 29 [2]: 89–91), which he described as "a hefty — and unfortunately unindexed — anthology on evolution and religion, distinguished by its emphasis on process thought, the philosophical-cum-theological approach to metaphysics based on the writings of [Alfred North] Whitehead" and "[o]ften fascinating, often frustrating." Copies of Branch's review are available from the NCSE office.

Among those honored in 2009 by the American Institute for Biological Sciences for their outstanding contributions to the biological sciences were three members of NCSE. In a joint statement quoted in a May 15, 2009, press release, AIBS President May Berenbaum and Executive Director Richard O'Grady said, "AIBS is pleased to honor such exceptional and dedicated individuals. Though they are from diverse backgrounds, they have all made significant positive contributions to the field of biology." They received their awards in a special ceremony at the AIBS annual meeting, "Sustainable Agriculture: Greening the Global Food Supply," in Arlington, Virginia, on May 18, 2009. **Joe Felsenstein**, Professor of Genome Sciences and Biology at the University of Washington, received the Distinguished Scientist Award. **Robert T Pennock**, Professor of Philosophy at Michigan State University, received the Outstanding Service Award; AIBS cited his book *Tower of Babel* (Cambridge [MA]: MIT Press, 1999) as well as his testimony in *Kitzmiller v Dover*. And NCSE Supporter **Bruce Alberts**, Professor of Biochemistry and Biophysics at the University of California, San Francisco, editor-in-chief of the journal *Science*, and past president of

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> ment came over the treatment of evolution in science standards — with social conservatives arguing for more critical coverage of the topic.

In a July 10, 2009, post on its blog (available on-line at <http://tfn-blog.wordpress.com/2009/07/10/breaking-news-perry-picks-lowe-to-head-sboe/>, the Texas Freedom Network lamented, "the governor once again appointed someone who repeatedly has put political agendas ahead of the education of Texas schoolchildren," adding:

> Lowe supported dumbing down the state's public school science curriculum by voting to include unscientific, creationist criticisms of evolution in science textbooks and curriculum standards.

And in a July 10, 2009, posting on the Houston Chronicle's Evosphere blog (available on-line via <http://www.chron.com/commons/reader blogs/evosphere.html>), Steven Schafersman of Texas Citizens for Science commented, "Lowe will do what the radical religious right powers want her to do. She will not stop the continuing politicization of public education in Texas by the Fundamentalist Christians who still have positions of power and influence. It will be business as usual, and. as usual, public education and the students and teachers of the state will suffer."

Texas: Two anti-evolution bills — House Bill 2800 and House Bill 4224 — died when the Texas legislature adjourned on June 1, 2009. HB 2800 would have exempted institutions such as the Institute for Creation Research's graduate school from Texas's regulations governing degree-granting institutions, thus freeing the ICR to offer a master's degree in science education despite the Texas Higher Education Coordination Board's 2008 decision to deny the ICR's request for a state certification of authority to offer the degree. The ICR is currently suing THECB in federal court over its decision. HB 4224 would have required the Texas State Board of Education to restore the controversial "strengths and weaknesses" language in the Texas state science education standards. Although creationists on the board were unsuccessful in restoring the "strengths and weaknesses" language, they successfully introduced a requirement that students examine "all sides of scientific evidence." Partly due to his attempts to undermine the treatment of evolution in the state science standards, the senate voted not to confirm Don McLeroy in his position as chair of the board; the *Fort Worth Star-Telegram* (2009 May 31) editorially commented, "It is overly optimistic to say the Senate's rejection of Don McLeroy as chairman of the State Board of Education will end the missteps and arguments that have plagued the board during the past two years. Still, we can hope."

the National Academy of Sciences, received the AIBS Education Award. Congratulations to all three!

NCSE's Faith Project Director **Peter MJ Hess** contributed a guest column, entitled "West of Eden," to the Washington Post's on-line "On Faith" feature (2009 Jun 16; available on-line at <http://newsweek.washingtonpost.com/onfaith/guestvoices/2009/06/west_of_eden.html>).

> Too often, debates over the public perception of evolution are dominated by the fringes, by fundamentalist Christians and others who reject basic science due to their literal reading of the Bible and by ardent atheists who reject religion because they've embraced metaphysical naturalism — that nature is all that exists.... Evolution can certainly be compatible with religious faith. Because the evidence for evolution is so overwhelming, we must consider it to be a truth about the natural world — the world which we as people of faith believe was created by God, and the world made understandable by the reason and natural senses given to us by God. Denying science is a profoundly unsound theological position.

Richard B Hoppe gave a series of talks on evolution at First Congregational United Church of Christ in Mount Vernon, Ohio, in late January and early February 2009. According to the *Mount Vernon News* (2009 Jan 30), in the first of his presentations, he explained the difference between evolution — "the observed phenomenon, the observable fact that the genetic composition of populations changes through time and generations, often altering the morphology or functioning of the organisms in the population" — and the theory of evolution, "the scientific explanation for how evolution occurs." He also discussed the opposition to evolution, noting, "Evolution says nothing one way or the other about the existence of God." Hoppe's talks were timely not only because of the Darwin anniversaries but also because of the ongoing hearings over the proposed termination of John Freshwater, a middle school science teacher in the Mount Vernon City School District accused of proselytizing in the classroom by displaying posters with the Ten Commandments and Bible verses, branding crosses into the arms of his students with a high-voltage electrical device, and teaching creationism (see *RNCSE* 2008 Jul/Aug; 28 [4]: 11–4, and p 6–8). Hoppe is reporting in detail on those hearings at The Panda's Thumb blog (<http://pandasthumb.org/cgi-bin/mt/mt-search.cgi?blog_id=2& tag=Freshwater>).

John Kricher's *The Balance of Nature: Ecology's Enduring Myth* (Princeton [NJ]: Princeton University Press, 2009) was published. The publisher writes:

> *The Balance of Nature* traces the fascinating history of the science of ecology and evolutionary biology, from the discipline's early innovators to the advent of Darwin and evolution, to the brilliant and inquisitive scientific minds of today. Blending insights and entertaining stories from his own remarkable life in science, Kricher reveals how evolution is a powerful engine that drives ecological change, how nature is constantly in flux and, in effect, quite naturally out of balance — and how notions to the contrary are misguided and ultimately hazardous to us all. *The Balance of Nature* forcefully argues that an understanding of the dynamic nature of ecology and evolution is essential to formulating policies of environmental ethics to guide humanity toward a more responsible stewardship of our planet's ecosystems.

Kricher is the A Howard Meneely Professor of Biology at Wheaton College.

NCSE Supporter **Richard Lewontin** reviewed a handful of books — Janet Browne's *Darwin's Origin of Species: A Biography*, James T Costa's *The Annotated* Origin, Jerry Coyne's *Why Evolution is True*, and Greg Gibson's *It Takes a Genome* — for *The New York Review of Books* (2009 May 28; 56 [9]: 19–22). "How are we to explain the extraordinary activity surrounding the 150th anniversary of the appearance of *On the Origin of Species*?" he asked, answering:

> The primary reason for the attention being paid to Darwin is the rejuvenation in recent years of theories of the divine creation of the earth and the organisms that inhabit it. ... The scientific community has the definite sense of being embattled and one of its responses is to use the two hundredth anniversary of the birth of its apostle of truth about the material basis of evolution and the 150th anniversary of the appearance of his gospel to carry on the struggle against obscurantism.

Lewontin is Alexander Agassiz Research Professor of Zoology and Professor of Biology Emeritus at Harvard University.

A recent story on the evolution of the immune system in *Science* (2009; 324 [5927]: 580–2) began by recounting the Perry Mason moment from the trial in *Kitzmiller v Dover*, when **Eric Rothschild** grilled "intelligent design" proponent Michael Behe about his claim "The scientific literature has no answers to the question of the origin of the immune system," piling a stack of articles and books on the topic on the witness stand. Orchestrating the moment was **Nick Matzke**, who was interviewed for *Science*'s Origins blog (2009 May 19; available on-line at <http://blogs.sciencemag.org/origins/2009/05/nicholas-matzke-qa-from-chat-r.html>). Explaining why the cross examination was a turning point in the trial, Matzke commented:

> Well, it was kind of the ultimate Behe defeat amongst a

long string of defeats during the Behe cross. ... Behe's direct testimony was the one big chance the defense had to come back after the plaintiffs had been beating on ID for 3 weeks during the plaintiffs' case. It was kind of a turning point for the whole ID argument over the last decade or two because it really exposed for all to see that ID was mostly boasting and dissembling, compared to the substance (physical substance, in the case of the immune system exhibit!) of the evolutionary science.

Matzke is currently working on a PhD in biology at the University of California, Berkeley.

The latest issue of *Evolution: Education and Outreach* includes NCSE's regular column, Overcoming Obstacles to Evolution Education. In "Transforming our thinking about transitional forms" (*Evolution: Education and Outreach* 2009; 2 [2]: 310–44; available on-line at <http://www.springerlink.com/content/501371w1h0h58385/fulltext.pdf>), NCSE's Education Project Director **Louise S Mead** explains:

Louise S Mead

> A common misconception of evolutionary biology is that it involves a search for "missing links" in the history of life. Relying on this misconception, anti-evolutionists present the supposed absence of transitional forms from the fossil record as evidence against evolution. Students of biology need to understand that evolution is a branching process, paleontologists do not expect to find "missing links," and evolutionary research uses independent lines of evidence to test hypotheses and make conclusions about the history of life. Teachers can facilitate such learning by incorporating cladistics and tree-thinking into the curriculum and using evograms to focus on important evolutionary transitions.

No fewer than four members and friends of NCSE were honored by the American Humanist Association at its 68th annual conference, held in Phoenix, Arizona, June 5–7, 2009: **PZ Myers,** of the University of Minnesota, Morris, and the popular science blog Pharyngula, received the Humanist of the Year award; **Barbara Forrest**, Professor of Philosophy at Southeastern Louisiana University and member of NCSE's board of directors, received the Humanist Pioneer Award; the Reverend **Barry Lynn** of Americans United for Separation of Church and State, received the Religious Liberty Award; and NCSE Supporter **Neil DeGrasse Tyson**, Director of the Hayden Planetarium at the American Museum of Natural History, received the Isaac Asimov Science Award.

Writing in *The Earth Scientist*, the journal of the National Earth Science Teachers Association, NCSE's **Steven Newton** explained (2009; 25 [2]: 30–3; available online at <http://www.nestanet.org/cms/sites/default/files/journal/Summer09.pdf>) in detail what's wrong with the new state science education standards adopted in Texas in March 2009, focusing on the Earth and Space Science standards in particular. At the behest of the creationist faction on the state board of education, references to the specific age of the universe, common descent, and evolution were removed, and language that misleadingly suggests that established scientific results are in doubt was introduced. Newton concluded, "Although the original ESS standards were based on strong science and outlined an excellent course in earth sciences, a number of creationist and anti-science amendments have weakened the ESS standards and disrespected the hard work and expertise of the writing team. The standards are finalized and in place, bad amendments and all. The struggle for science education in Texas now shifts to the adoption of textbooks in 2011, when these deeply-flawed amendments may be used to force a creationist agenda into Texas science classrooms."

Writing in *Seed*, NCSE's **Joshua Rosenau** explained what the new Texas state science standards mean for science education nationwide. Rosenau, who attended (and blogged from) both the January and the March meetings of the Texas state board of education (see *RNCSE* 2009 May/Jun; 29 [3]: 6–7), wrote, "Despite our efforts, after a total of 24 hours of testimony in three separate hearings, pro-evolution moderates brokered a compromise with the board's seven creationists. Heeding McLeroy's cry that 'someone's got to stand up to experts!,' the board approved standards that promote creationism's mantra of 'sudden appearance' of new species, echo creationist beliefs that the complexity of the cell cannot be scientifically explained, and mandate that students study 'different views on the existence of global warming.'"

In the wake of the adoption of the flawed standards in Texas, Rosenau explained:

> Textbook publishers are already preparing for hearings in 2011, which will judge whether rewritten textbooks fit the new standards. Textbook author and biologist [and NCSE Supporter] Ken Miller and publisher Rene LeBel both say they'll abide by the letter, but not the spirit, of the standards; for instance, by fulfilling the requirement to cover "all sides of *scientific* evidence" without including creationist pseudoscience. Miller, a vocal defender of evolution education, insists that "biology textbook authors will all stand together on evolution," refusing to include creationist attacks or to drop good science.

But it is not only the authors and publishers of textbooks that are preparing to defend the integrity of science education, and it is not only in Texas — as Rosenau related, "The NCSE recently worked with a family and local professors to give a student in Washington the courage to denounce his teacher's creationist lectures. He won not only the school's support but also

a college scholarship from the ACLU." The lesson to be learned from the experience of those fighting for the integrity of science education, whether in Texas, Washington, or wherever it is under assault, Rosenau concluded: "It doesn't take an expert to stand up for science. Whether the battle is large or small, success depends on these types of broad coalitions." His article is available on-line at <http://seedmagazine.com/content/article/dont_mess_with_textbooks/>.

NCSE Supporter **Michael Ruse** offered his view of "Ida" to *Forbes* (available on-line at <http://www.forbes.com/2009/06/01/jorn-hurum-discovery-opinions-contributors-ida.html>), writing, "I am really glad Ida has been discovered and I look forward to learning much more about her. I hope she is the first of many such finds. But I may be forgiven if I wish that she had not been introduced with quite such fulsome acclamation." Ruse is Lucyle T Werkmeister Professor of Philosophy and director of the Program in the History and Philosophy of Science at Florida State University.

NCSE's executive director **Eugenie C Scott** was among the *Scientific American* 10 for 2009, described by the magazine in its June 2009 issue as "researchers, politicians, business executives and philanthropists who have recently demonstrated outstanding commitment to assuring that the benefits of new technologies and knowledge will accrue to humanity." The citation (available on-line at <http://www.scientificamerican.com/article.cfm?id=scientific-american-10&page=3>) reads, in part:

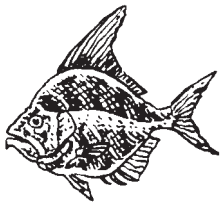
Eugenie C Scott

> Thomas Henry Huxley was the 19th-century biologist known as "Darwin's bulldog" for his defense of the great scientist's ideas. The 21st century has a counterpart in the woman who describes herself as "Darwin's golden retriever." Eugenie Scott has emerged as one of the most prominent advocates for keeping evolution an integral part of the curriculum in public schools in her role as head of the nonprofit National Center for Science Education (NCSE). ...With the ever changing semantics of anti-evolutionists, Darwin's golden retriever will have plenty more chances to act as a loyal defender of teaching evolution in the schools.

Besides Scott, the *Scientific American* 10 for 2009 are Todd Brady of Intel, Shai Agassi of Better Place, Wafaa El-Sadr of Harlem Hospital Center, Robert J Linhardt of Rensselaer Polytechnic Institute, Bill Gates and Michael Bloomberg, Bryan Willson of Colorado State University, Kristian Olson of the Center for Integration of Medicine and Innovative Technology, Andras Nagy of Mount Sinai Hospital in Toronto, and President Barack Obama.

NCSE's executive director **Eugenie C Scott** was also the first recipient of the annual Stephen Jay Gould Prize, awarded by the Society for the Study of Evolution "to recognize individuals whose sustained and exemplary efforts have advanced public understanding of evolutionary science and its importance in biology, education, and everyday life in the spirit of Stephen Jay Gould." According to the citation:

> As the executive director of the National Center for Science Education she has been in the forefront of battles to ensure that public education clearly distinguishes science from non-science and that the principles of evolution are taught in all biology courses. ... In these efforts, she has been an important leader in the public sphere, molding and focusing the efforts of scientists, educators, lay people, religious groups, skeptics, agnostics, believers, scholars, and ordinary citizens through firm but gentle guidance. ... Dr Scott is a gifted communicator and public intellectual. She is a frequent guest on radio and television shows, and an eloquent spokeswoman for science. Her writings have illuminated the process of science to thousands, and her books have exposed the efforts of many groups in our society to hobble and undermine the teaching of science to our younger generation. The organization she helped create far transcends the considerable reach of her own voice, vastly amplifying her impact on public understanding. For these many reasons, it is extremely appropriate that Dr Scott be the first recipient of the Gould Prize.



She received the award at the Evolution 2009 conference, held June 12–16, 2009, at the University of Idaho, where she also presented a public lecture entitled "The public understanding of evolution and the KISS principle" (available on-line at <http://realvideo.uidaho.edu:8080/ramgen/biosci/evolution09.rm>.

Scott was also interviewed in *Science* (2009; 324 [5932]: 1250–1) under the headline "**Eugenie Scott** Toils in Defense of Evolution." Explaining that the anti-evolution movement has become more diverse over the last twenty years, Scott reviewed the present situation, noting especially the prevalence of "closet creationism being introduced through wording not obvious to those unfamiliar with the history of the controversy." Asked what scientists should do to help the cause of defending the teaching of evolution, she answered, "Universities need to do a better job of teaching evolution because that's where high school teachers get their training. Evolution needs to be brought into every course of biology instead of getting tacked on as a unit to the intro class." (The full text of the interview is available on NCSE's website at <http://ncseweb.org/news/2009/06/eugenie-c-scott-interviewed-science-004823>.)

Pat Shipman contributed "Science meets fundamentalist religion" (p 118–29) to *Science and the Media: Delgado's Brave Bulls and the Ethics of Scientific*

NCSE Encourages Federal Scientific Integrity

Joshua Rosenau

NCSE recently offered its advice on ways the federal government can promote and protect scientific integrity. The comment will be considered as presidential science advisor John Holdren and the Office of Science and Technology Policy (OSTP) develop regulations implementing President Obama's March 9, 2009, memorandum ordering federal agencies to "ensur[e] the highest level of integrity in all aspects of the executive branch's involvement with scientific and technological processes."

The order specifically asks the OSTP to recommend regulations protecting scientific staff from political litmus tests in hiring and firing, ensuring scientific integrity of internal processes, requiring that information used in policy-making "be subject to well-established scientific processes, including peer review where appropriate," making scientific findings publicly available, and generally "ensur[ing] the integrity of scientific and technological information and processes on which the agency relies in its decision-making or otherwise uses or prepares."

NCSE's comment to the OSTP focuses on educational materials used in informal education at federal facilities, citing reports of creationist books offered for sale at Grand Canyon National Park bookstores and of a political appointee at NASA demanding that the Big Bang be called a "theory" on public websites because "it is not proven fact; it is opinion." It also expresses concern about reports of creationism being taught at schools directly administered by the federal government.

Comments on scientific integrity regulations

National Center for Science Education

The National Center for Science Education is a nonprofit organization dedicated to protecting the teaching of evolution, and to improving understanding of the nature of science. Attacks on the scientific integrity of federal policy pose great dangers to public understanding of science, and we applaud efforts to prevent such abuses. In particular, we hope that the resulting policies will protect the treatment of evolution and related scientific concepts in the federal government's important contributions to informal science education.

Informal science education occurs at parks, museums, and research centers, and includes signs and displays, public lectures or tours at such facilities, and websites and brochures which describe the research conducted at a site, or which provide background on an agency's research. Teachers, school groups and the general public rely on such material for accurate and unbiased scientific information. Such material therefore must reflect the generally accepted views of the scientific community, and indeed, in some federal agencies, this is required by existing statute or regulation. Omission and simplification is unavoidable in educational contexts, but scientifically and pedagogically valid content should not be altered for political or religious purposes. Peer review of educational content is appropriate and necessary; the reviewers should include both scientists and educators with experience in relevant fields. Science educators at federal sites must be protected against political or religious censorship.

Over the last several years, NCSE has monitored attacks on evolution and related concepts in several different federal agencies. Some examples illustrate the dangers and may suggest policies which would avoid similar problems.

There is a long-running conflict over a creationist book being sold in the science section of bookstores at Grand Canyon National Park, creating a conflict between the scientifically-oriented presentations of Park Service staff and an implied Park Service endorsement of erroneous scientific views. The federal government should not lend its credibility to material which falsely claims scientific support for a 6000-year–old earth or other attempts to masquerade religious apologetics as science. It is

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Disclosure, edited by Peter J Snyder, Linda C Mayers, and Dennis D Spencer (London: Academic Press, 2008). Reviewing controversies over the teaching of evolution in Dover, Pennsylvania (*Kitzmiller v Dover*), El Tejon, California (*Hurst v Newman*), and around the world, she then turned her attention to science and the media, commenting, "the media does not do its full part in educating the public about science. ... Instead of dwelling on the push and pull of scientific inquiry and the testing process that any good new hypothesis provokes, media stories often focus on startling discoveries and overturned theories." And she concluded by discussing science, morality, and the media, arguing, "Whether one honors God and science, or God OR science, these moral imperatives call us to attention" (emphasis in original). Shipman is adjunct professor of biological anthropology at Pennsylvania State University and a prolific science writer.

Joshua Rosenau is Public Information Project Director at NCSE.

appropriate to discuss religious views in publications, presentations, and other educational settings, but the integrity of the scientific process is compromised when descriptions of religious views are not clearly distinguished from empirically tested scientific results.

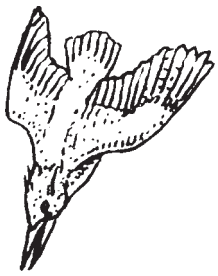
A NASA public affairs officer ordered changes to the discussion of the Big Bang on NASA web pages, demanding that it be referred to as "a theory" because "it is not proven fact; it is opinion." The official also blurred the line between science and religion: "It is not NASA's place, nor should it be, to make a declaration such as this about the existence of the universe that discounts 'intelligent design' by a creator." Making those changes would have misinformed the general public, including schoolchildren, about both cosmology and the scientific process. Agency websites, especially educational websites describing scientific research and scientific knowledge, should adhere to the highest standards of scientific accuracy, and should be free from political or religious pressure.

NCSE has received reports that interpreters at certain National Park Service sites were instructed to avoid discussing the (ancient) age of the earth or the age of particular rock strata, to "avoid controversy". Of course, there is no *scientific* controversy concerning an ancient age of the earth; the controversy was religious. School groups and the general public rely on programs at National Parks for accurate, unbiased information, and should be confident that scientific content will not be censored for religious reasons. Policies for public information programs must distinguish scientific controversy from political or societal controversy. Educational staff at parks or in other educational programs administered or funded by the federal government must not be restricted from discussing relevant science that is widely accepted by the scientific community. Where a topic is regarded as controversial, agencies should allow review by scientists and educators experienced in the topic and age groups at issue and should defend that peer-reviewed content.

The Bureau of Indian Affairs and the Department of Defense directly administer schools, and the Department of Education supports teachers and administrators in schools nationwide. In schools administered by the federal government, as in all public schools, science classes must present science as it is understood and practiced by the scientific community. Science textbooks and other instructional materials ought to be subject to peer review and approval by educators who teach the subject at the same grade level. Scientific materials published by federal agencies for use in classrooms should be subject to peer review by scientists and teaching experts, and not subject to political or religious interference. In order to safeguard the integrity of the scientific process, instructional materials used by federal schools or provided to teachers by the federal government should describe the nature of science in clear terms, emphasizing that scientific explanations must be open to empirical testing and that they are evaluated by a community of scientists.

NCSE has received reports of teachers in Department of Defense schools teaching creationism or being pressured not to teach evolution; this is a widespread problem in public schools, with 31% of respondents to an informal survey by the National Science Teachers Association reporting pressure not to teach evolution and 30% reporting pressure to teach creationism. Evolution is accepted by the scientific community as the foundation of modern biology, and must be the organizing principle of biology classes and biology instructional materials. In addition, federal schools must establish policies protecting teachers from pressure to omit or downplay evolution, or to teach religious alternatives to evolution, in science classes.

Establishing clear policies protecting the accuracy of formal and informal educational content provided by the federal government is necessary to ensure the long-term integrity of science. Such content prepares the next generation of federal scientists, and is vital to constituents as they evaluate science-based policies. In particular, agencies should develop policies that provide for scientists and educators to peer review material and to protect potentially controversial topics from political or religious pressure.



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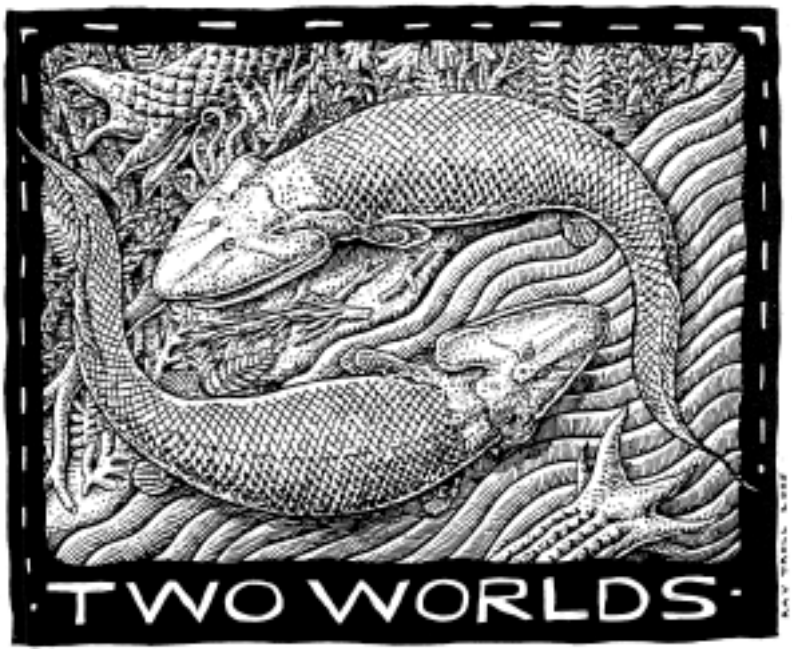
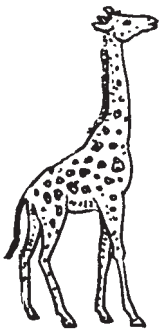


NCSE Honors "Friends of Darwin" for 2006

Glenn Branch

Every year, NCSE honors a few exceptional people for their support of evolution education and/or their service to NCSE. The "Friend of Darwin" awards are proposed by the staff and approved by the board at its annual meeting; the recipients for the award for a given year are thus selected in the spring of the following year. NCSE usually arranges for the awards to be presented to their recipients by their family, colleagues, and friends, so it often takes a while before a public announcement is possible. And then sometimes there are further delays! Here, finally, are the Friends of Darwin for 2006.

Robert Cashner recently retired from the University of New Orleans, where he served, in the course of a thirty-five–year career, as professor of biological sciences, Dean of the Graduate School, and Vice Chancellor for Research and Sponsored Programs. He received the university's Cooper R Mackin Medallion in 2008 in recognition of his outstanding record of teaching, research and publications. A distinguished ichthyologist, he is a past president and a permanent member of the Board of Governors of the American Society of Ichthyologists and Herpetologists. And since 2001, he spearheaded the Darwin Day celebrations at the University of New Orleans, providing space, recruiting sponsors, obtaining publicity, engaging speakers, and arranging — even after his retirement — for the annual celebrations of Darwin's contributions to science to continue.



Steven G Gey, David and Deborah Fonvielle and Donald and Janet Hinkle Professor at the Florida State University College of Law, is one of the nation's foremost scholars on religious liberties and free speech. With Matthew J Brauer and Barbara Forrest, he wrote one of the most important law review articles about creationism, "Is it science yet? Intelligent design, creationism, and the Constitution" (*Washington University Law Review* 2005; 83 [1]: 1–149). As a member of NCSE's legal advisory committee, he is a constant source of thoughtful advice. Gey was presented with his Friend of Darwin award in March 2007, at a banquet that followed a triathlon to raise funds for amyotrophic lateral sclerosis research in his honor; sadly, Gey was diagnosed with ALS ("Lou Gehrig's disease") in 2006.

John F Haught is a renowned theologian at Georgetown University, where he was formerly Chair and Professor in the Department of Theology and is now a Distinguished Research Professor as well as a Senior Fellow of the Woodstock Theological Center. The author of a number of books on the theology of evolution, including *God After Darwin: A Theology of Evolution*, second edition (Boulder [CO]: Westview Press, 2007), *Responses to 101 Questions on God and Evolution* (Mahwah [NJ]: Paulist Press, 2001), and *Deeper Than Darwin: The Prospect for Religion in the Age of Evolution* (Boulder [CO]: Westview Press, 2003), he also testified effectively on the theological roots of "intelligent design" creationism for the plaintiffs in *Kitzmiller v Dover*, the case establishing the unconstitutionality of teaching "intelligent design" in the public schools.

Victor Hutchison is George Lynn Cross Research Professor Emeritus at the University of Oklahoma. A distinguished zoologist and a former president of the American Society of Ichthyologists and Herpetologists and of the Society for the Study of Amphibians and Reptiles, he is also a spirited defender of the integrity of science education in Oklahoma, founding Oklahomans for Excellence in Science Education in 2004 and serving as its president for four years — a period in which Oklahoma endured a storm of anti-evolution legislation, with four bills appearing in 2006 alone. Thanks to Hutchison's and OESE's work, none of these bills passed. Moreover, OESE promotes the public understanding of evolution through participating in educational and scientific conferences, organizing workshops for science teachers, and operating a bureau of speakers.

M Kim Johnson is a physicist who serves on the board of New Mexicans for Science and Reason and of New Mexico's Coalition for Excellence in Science and Math Education; he is a past president of CESE as well as of the New Mexico Academy of Science. With his colleagues in those organizations — especially Dave Thomas and Marshall Berman, both of whom received Friend of Darwin awards in 1999 — he helps to defend the teaching of evolution in New Mexico's public schools against legislators introducing anti-evolution bills, lobbyists attempting to undermine the treatment of evolution in the state science standards, and school districts adopting anti-evolution policies. He also works to promote the public understanding of science, especially through posts on The Panda's Thumb blog and broadcasts on NMSR Science Watch, a weekly radio show.

Philip Kitcher is the John Dewey Professor of Philosophy at Columbia University. A leading philosopher of science, he is also a long-time critic of creationism, having debated young-earth creationist Duane Gish in person and "intelligent design" creationist Phillip Johnson on-line. His first book was *Abusing Science: The Case Against Creationism* (Cambridge [MA]: MIT Press, 1983), which Martin Gardner praised as "[a] marvelously lucid summary of the evidence for evolution and the overwhelming case against its enemies." Kitcher returned to the fray twenty-four years later with *Living with Darwin: Evolution, Design, and the Future of Faith* (New York: Oxford University Press, 2007), of which Jerry Coyne wrote, "Kitcher has just the combination of philosophical talent, biological insight, and wonderfully lucid writing needed to address the thorny problem of creationism."

We thank these and all NCSE members for their support of our organization and our mission. We cannot — and do not — do it alone!

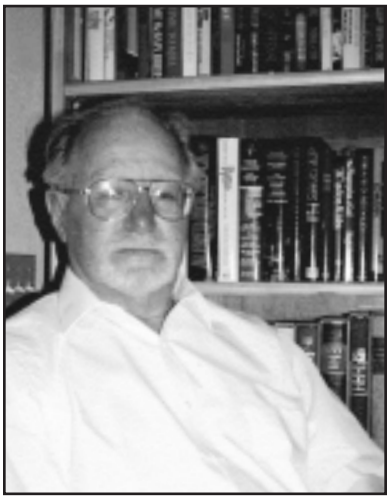
Glenn Branch is deputy director of NCSE.

Unintelligent Design: Interview with Mark Perakh

Interviewed by Glenn Branch

Mark Perakh was born in 1924 in Kiev, Ukraine. In 1941 he volunteered to fight the German invasion of the USSR. Later he studied at the Odessa Institute of Technology, earning a Diploma in Engineering Physics, and later an equivalent of a PhD degree from the Odessa Polytechnic Institute. In the 1950s he was arrested by the KGB on the charge of engaging in "anti-Soviet propaganda" and spent several years in a Siberian prison camp. Subsequently, he conducted research and taught physics in several universities in the USSR. In 1967 he received a third degree (the highest in the Soviet system) from Kazan Institute of Technology. He emigrated to Israel in 1973, where he was appointed a full professor at the Hebrew University of Jerusalem. He received a number of prizes and awards for his research, including one from the Royal Society of London. He has authored close to 300 scientific papers and several monographs, which resulted in an invitation for a two-year stint at the IBM Research Center in the US. Later he joined the faculty at California State University, Fullerton. He retired in 1994 and lives near San Diego.

Perakh's book *Unintelligent Design* (Amherst [NY]: Prometheus, 2004) contains three sections. The first offers a detailed critique of "intelligent design" creationism as purveyed by William Dembski, Michael Behe, and Phillip Johnson; reviewing the book for *RNCSE* (2004 May/Aug; 24 [3–4]: 49–50), Jason Rosenhouse commented, "I did not fully appreciate the sheer extent of ["intelligent design"'s] awfulness before reading Mark Perakh's *Unintelligent Design*." The second addresses various attempts to reconcile the Bible with science, focusing on those by Hugh Ross, Grant Jeffrey, Fred Hereen, Nathan Aviezer, Lee Spetner, and Gerald Schroeder. The third discusses issues in the nature of science and in probability theory, using the so-called Bible codes as a cautionary example.



In the five years since the publication of *Unintelligent Design*, Perakh's concern about religiously motivated pseudoscience continued unabated. He contributed a chapter ("There is a free lunch after all: William Dembski's wrong answers to irrelevant questions") and coauthored another ("Is intelligent design science?" with Matt Young) to Matt Young and Taner Edis's collection *Why Intelligent Design Fails* (New Brunswick [NJ]: Rutgers University Press, 2004). And he published a series of further valuable articles, both in the pages of journals such as *RNCSE*, *Skeptic*, and *Skeptical Inquirer*, and on-line on The Panda's Thumb blog (<http://www.pandasthumb.org/>) and the Talk.Reason website (<http://www.talkreason.org/>), of which he is a founder and editor.

RNCSE: The year 2009 is the bicentennial of Darwin's birth and the sesquicentennial of the publication of the *Origin of Species* — but it is also the fifth anniversary of the publication of *Unintelligent Design*. What impelled you to write *Unintelligent Design*, and how did you become interested in religiously motivated pseudoscience like the Bible Code and creationism in the first place?

MP: After my retirement (at 70) I lost access to labs where I could have continued research within the framework of my specialization. On the other hand, I have always been interested in the philosophical underpinnings of science, and I just could not imagine spending my retirement years without some activity giving food to my brain. By accident, I came across the Bible Code fad, and wanted to clarify, first of all for myself, whether there was any factual foundation to it. I investigated the available material and came to the firm conclusion that the Bible Code existed only in the imagination of its proponents. This led to my cooperation with a prominent mathematician, Brendan McKay, with whom I developed a new method for statistical analysis of texts — dubbed the Letter Serial Correlation (LSC). All this activity attracted the attention of a number of people, and one day I was asked to review Behe's *Darwin's Black Box* and Dembski's *The Design Inference.* Thus I got involved in the fight for the integrity of science and against various versions of creationist pseudoscience, especially the "intelligent design" non-

sense. Writing a book gathering my ideas about creationism and its pernicious efforts to undermine genuine science was a natural outcome of my pro-science and pro-reason activity.

RNCSE: As a physicist, you usually formulate your critiques of "intelligent design" to avoid the biological minutiae. Do you regret not being able to engage more closely with such details? Have you found yourself learning more about biology?

MP: Yes, I regret it in the same sense as I regret, say, that I am not fluent in French or Italian. In fact, my early interest in science was in biology. Perhaps this was due to my friendship with a remarkable girl who was my neighbor. Ania was two years older than I, and our friendship started when I was about 10 or 11. She was highly intelligent, and had a great influence over me. At the age of 12 she was already much interested in biology, and attended the Children's Agro-Biological station in a suburb of Odessa, where she conducted simple experiments studying the nervous systems of fish. She suggested that I accompany her. At that time I imagined my future as both a writer of fiction and a scientist specializing in biology. Then the war started, and our plans could not be implemented. In occupied Odessa, Ania participated in an Ukrainian guerilla gang fighting the Romanian and German occupation forces; after the liberation of Odessa by the Soviet army, she was arrested by the KGB and perished in the northern camps. And I went in 1941 to fight the Germans, and afterwards to study physics rather than biology. Regarding the possible recent improvement of my knowledge of biology, I have read a number of books including the *Origin of Species*, and the great *A View of Life* by Gould, Singer, and Luria, trying to acquire some minimal knowledge of biology, but I realize that it has not made me an expert in any sense of the word, so I view myself as an amateur in biology.

RNCSE: Your book received generally appreciative treatments from the scientific, educational, and skeptical journals that reviewed it. But what kind of reaction was there from the "intelligent design" creationists themselves?

MP: None of the authors who were the targets of my critique — Dembski, Behe, Johnson, Schroeder, and so on — deigned to respond. (I do not count a couple of very short remarks by Dembski, limited to *ad hominem*s and name-calling, lacking any attempts to address the substance of my critique.) Instead, rude assaults upon me appeared on a number of creationist websites, where I was called stupid, dense, a hypocrite, a liar, an idiot, and similar names, without even a slightest attempt to address the substance of my arguments. When I debated Behe on a television program hosted by Larry Kane in February 2008, I found that Behe was perfectly aware who I was and was evidently familiar with my critique — although he never replied in any form, shape, or manner. Where I came from (that is, a scientific environment), such silence is usually interpreted as inability to come up with reasonable counterarguments.

RNCSE: There was a droll exception to the resounding silence, though, involving a review on Amazon.com from "A Reader from Waco" whose anonymity was accidentally breached — can you tell that story?

MP: This funny story has been told in detail in my posts on The Panda's Thumb and Talk Reason (see, for example, <http://www.talkreason.org/articles/shenanigans.cfm>). Briefly it is as follows. A few days after the release of my book a review of it appeared on the Amazon.com website, signed "Reader from Waco, TX." The review contained no discussion of my arguments, but instead bluntly claimed them to be erroneous and recommended instead some creationist books, including a forthcoming book by Dembski. Since the author of that review recommended Dembski's book, which had not yet appeared, and since Dembski was at that time employed at Baylor University situated in Waco, a natural assumption was that it was Dembski himself who posed as an allegedly unbiased reader to denigrate my book and to promote his own book. Indeed, shortly thereafter, there was a glitch on the Canadian version of the Amazon.com website where the real names of anonymous reviewers were inadvertently revealed for a whole week. Of course, the "reader from Waco" turned out to be Dembski. With an amazing arrogance, Dembski promptly removed his review, which immediately reappeared verbatim, but now signed "Reader from Riesel, TX." Riesel is where Dembski had his residence. By thus changing the signature, Dembski evaded the counter-critique from other reviewers who responded to "Reader from Waco."

RNCSE: "Intelligent design" creationists are fond of comparing the scientific establishment to the Nazi regime and the Soviet regime: for example, George Gilder, the cofounder of the Discovery Institute, reportedly denounced "Darwinian storm troopers" at a conference, while William Dembski wrote, "Doubting Darwinian orthodoxy is comparable to opposing the party line of a Stalinist regime." You volunteered to fight the Nazis in World War II — or, I should say, in the Great Patriotic War — and later in your life, you were sent to a prison camp for supposedly engaging in anti-Soviet propaganda, so you are in a particularly good position, I imagine, to comment on such comparisons.

MP: In an essay I co-authored with Wesley Elsberry (see <http://www.talkreason.org/articles/eandp.cfm>) we discussed the creationist writers' habit of comparing their opponents to Nazis, storm troopers, the Soviet oppressive regime, Salem judges, Lysenko, and the like. Specifically, in my part of the essay, I referred to my personal experience with both the Soviet and the Nazi totalitarian systems. I lived for many years in the USSR and was myself persecuted by the KGB, which put me into a Siberian prison camp for engaging in so-called anti-Soviet propaganda (which was their standard term for any utterance short of parroting the official lies of the communist rulers). As to the Nazi regime, in the aftermath of the war, I served

in the Soviet military administration in Germany and had access to vast amounts of the documentation left by the destroyed Nazi regime. As I demonstrated in that essay, in fact it is creationists whose behavior has been often reminiscent of the practice of stormtroopers in Nazi Germany and of the Soviet repressive state.

RNCSE: Yet in *The Politically Incorrect Guide to Darwinism and Intelligent Design* (Washington [DC]: Regnery, 2006), Jonathan Wells had the gall to distort your rebuttal of such comparisons, in effect fabricating a quote that he attributes to you.

MP: Yes, this "intelligent design theorist" wrapped in a mantle of a biologist brazenly fabricated an alleged "quotation" from my essay. He transposed various sentences from my essay, placing those that occur somewhere later in the text, ahead of some other that in fact occur earlier in the text; he used ellipsis in several cases, apparently to hide from readers the exact wording of my essay; and he combined partial quotes taken from different parts of my essay in an allegedly single sentence — thus fraudulently attributing to me something I did not say, as I have discussed in detail at <http://www.talkreason.org/articles/ugly.cfm>. After I revealed how he performed his dishonest trick, Wells has been pretending that my revelation does not exist. Well, what can you expect from a pseudo-biologist who makes his living via mendacious shenanigans?

RNCSE: Since the publication of *Unintelligent Design*, what critiques of "intelligent design" have you found to be the most interesting and the most valuable?

MP: First, I would like to mention that simultaneously with my book, two other books appeared addressing "intelligent design" — *Creationism's Trojan Horse* by Barbara Forrest and Paul R Gross, and *God, the Devil, and Darwin* by Niall Shanks. I value both books highly. I think they nicely complement my book, as all three deal with the same crank science but analyze it from different standpoints. Then, several months later, an anthology edited by Matt Young and Taner Edis, entitled *Why Intelligent Design Fails*, was published, which contained essays by thirteen scientists who pounced on the crank science of "intelligent design". I authored one chapter in that anthology and co-authored another, so I cannot offer an evaluation of those two chapters, but in my view the other eleven chapters provide a devastating deconstruction of the intelligent design "theory" in a detailed, professionally unbiased way. More recently, several more books appeared, which, if not always directly devoted to the refutation of "intelligent design" pseudoscience, touch on that subject to a certain extent. I may mention the always entertaining books by Richard Dawkins, Jerry Coyne, Vic Stenger (especially his recent *God: The Failed Hypothesis*), and more. Last but not least, NCSE's own Genie Scott's very effective book cannot be left unmentioned.

RNCSE: Your own attitude to religion is generally irenic; toward the end of your book, you say that you see no reason to accept the specific claims of Judaism, Christianity, and Islam, but you also express agnosticism about the existence of God. What is your reaction to the ongoing debates about whether evolution can be, or should be, used to promote atheism?

MP: I think that both viewpoints — one based on the notion that evolution theory leads to the rejection of faith, and the other on the notion that evolution theory can be viewed as compatible with religious faith — are legitimate. The choice between the two should be left to each individual. There is a whole spectrum of views between the two extremes. On one extreme we have, for example, PZ Myers, a pretty militant atheist who perceives no way to reconcile religious faith with the facts of science. I think I understand his attitude and sympathize with it. On the other extreme we have, for example, Kenneth Miller, in whose opinion the firmly established truth of evolution can be reconciled with religious faith, and even can be construed as supporting it. While I personally doubt the validity of Miller's argument in the latter sense, I am inclined to accept his position as a legitimate choice, even if I cannot share it.

Should evolution be used to promote atheism? I just believe that everybody must be entitled to his or her own position and to promote it if he or she wishes to do so. So, if PZ Myers sincerely believes that evolution and faith are incompatible, he must have the freedom to promote his view in any way he deems proper. Likewise, if Genie Scott rejects Myers's attitude, and favors a friendly dialog with believers, she must have the right to promote her views as much as she wants. The considerations of which choice is more expedient must, in my view, be secondary. I don't think anybody has a monopoly on truth, so every extreme position has to be evaluated with a grain of salt.

Writing a book about creationism and its pernicious efforts to undermine genuine science was a natural outcome.

RNCSE: At the age of 84, you have a good claim to be the oldest currently active opponent of creationism. Do you find it dispiriting to think that the struggle is going to continue?

MP: Well, this is something that nobody can do anything about. People will always have opinions, and they never will be the same for everybody. This relates not only to the creationism versus evolution encounter, but to an endless list of other problems as well. I will not see it, but my grandsons' future looks to me not very bright. Most probably the 21st century will see devastating wars, depletion of resources (land, water, and so on), enormous explosions of barbarism of various kinds. Humans as a species are the most stupid of all animals. I came to this conclusion watching firsthand the big war of the 20th century. There is hardly anything more stupid than a war, but humans seem to be unable to live without it. The struggle between reason and obscurantism, however important, is just a footnote to the idiocy of wars humanity sinks into with an inevitable regularity.

Whither "Intelligent Design" Creationism?

Lawrence S Lerner

Since the 1960s, creationism has evolved, with the pressure of "judicial selection" giving rise to new species. The most prominent 1960s program — young-earth creationism or YEC — was based explicitly on the Book of Genesis. It aimed at teaching K–12 science students that God created the universe in six days by a series of fiats and that nearly all of geology could be explained in terms of the action of Noah's Flood. In spite of such labels as "creation science", the courts had little difficulty in perceiving that this was a religious rather than a scientific explanation, inappropriate for public school science classes. Thus the creationist search was on for a fuzzier God who might do better, and I remember hearing the noncommittal term "abrupt appearance" for the first time from creationist lawyer Wendell Bird around 1991.

That term has certainly been used, but by itself it is too impersonal to satisfy most creationists. Thus arose "intelligent design" creationism (IDC). By implying a designer, IDC fulfilled the need of many or most creationists to inject the supernatural works of a chronically interventionist God into observable nature (and by extension into human affairs). At the same time, the IDC approach was vague enough to allow dissembling about the designer's identity. He/she/it might indeed be the biblical God for insider consumption, but space aliens or other even less identifiable entities could be used to satisfy the wider public that the movement was not a religious one.

The 2005 decision of Judge John E Jones III in *Kitzmiller v Dover* put a crimp into that approach (see the complete ruling at <http://www.pamd.uscourts.gov/kitzmiller/kitzmiller_342.pdf>). The trial testimony made crystal clear the religious motivations of the Dover Area School Board, to the extent that even the Discovery Institute — the main proponent of IDC — backed off. But beyond that, the inherently religious nature of IDC, and its essential identity with creationism in the broader sense, were made transparent.

With further disguise of the religion-driven agenda a pressing need, the Discovery Institute and other organizations have searched for deeper cover. Favored catchwords include "teaching the controversy", stressing the "gaps in Darwin's theory", presenting "the arguments for and against Darwinism", or simply "critical analysis" (*see p 28*). Specifically, critical analysis is to be applied to biological evolution in a way that singles it out as somehow less scientific than gravitation or the atomic theory of matter. Of course, calling modern evolutionary biology "Darwin's theory" or "Darwinism" is just about as accurate as calling modern physics "Newton's theory" or "Newtonism".

But these negative tactics by themselves can never be very satisfactory for forwarding the overall creationist program (see, for example, the "Wedge" document, available on-line at <http://www.antievolution.org/features/wedge.html>). All they do is cast doubt on science. True, if one can preach to students about the inadequacy of biological evolution in class, one may perhaps tell them about the ubiquitous interventions of the Old Testament God after school. But something more positive is clearly wanting. IDC badly needs a crypto-religious device that can masquerade as a superior (or at least competitive) scientific alternative to "Darwinism" and has a chance of passing the court tests excluding religion from public school science classes.

In the wake of the *Kitzmiller* decision, I wondered where creationists might find such a device. It would not have to be good science — there is no law requiring that *good* science be taught in science classes — as long as it did not look like religion to the casual observer. Yet it would have to have strong religious implications to satisfy the actual creationist program.

Rising from the ashes of defeat

This idea drew me back to a college humanities class I attended about 1953, in which a major reading was French metaphysician Henri Bergson's 1907 classic, *Creative Evolution.* Building on earlier ideas going back as least as far as Aristotle, Bergson argued that the natural processes underlying evolution are supplemented — or perhaps even driven — by a nonmaterial *élan vital* (of which more later). Whatever it may be, *élan vital* adds contingency to what he saw (erroneously) as an otherwise deterministic pathway. Bergson also puts heavy weight on the idea that intuition is in some sense a

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Lawrence S Lerner is Professor Emeritus of Physics and Astronomy at California State University, Long Beach, and a recognized expert on state science standards. He was the recipient of a Friend of Darwin award from NCSE in 2003.

What is "Intelligent Design" Creationism?

This note is excerpted from an article originally posted on the NCSE website. To see the original, visit <http://ncseweb.org/creationism/general/what-is-intelligent-design-creationism>.

"Intelligent design" creationism (IDC) is a successor to the "creation science" movement, which dates back to the 1960s. The IDC movement began in the middle 1980s as an anti-evolution movement that could include young-earth, old-earth, and progressive creationists; theistic evolutionists, however, were not welcome. The movement increased in popularity in the 1990s with the publication of books by law professor Phillip Johnson and the founding in 1996 of the Center for the Renewal of Science and Culture (now the Center for Science and Culture). The term "intelligent design" was adopted as a replacement for "creation science," which was ruled to represent a particular religious belief in the Supreme Court case *Edwards v Aguillard* in 1987.

IDC proponents usually avoid explicit references to God, attempting to present a veneer of secular scientific inquiry. IDC proponents introduced some new phrases into anti-evolution rhetoric, such as "irreducible complexity" (Michael Behe: *Darwin's Black Box*, 1996) and "specified complexity" (William Dembski: *The Design Inference*, 1998), but the basic principles behind these phrases have long histories in creationist attacks on evolution. Underlying both of these concepts, and foundational to IDC itself, is an early 19th-century British theological view, the "argument from design".

The essence of the argument from design is that highly complex phenomena (such as the structure of the vertebrate eye) demonstrate the direct action of the hand of God. Modern IDC proponents typically substitute cellular or sub-cellular structures (such as the rotor-motor of a bacterium's whip-like flagellum) for anatomical complexity, but make the same argument: the appearance of complexity in nature categorically cannot be explained through natural causes; it requires the guidance of an "intelligent agent".

Following Phillip Johnson's lead, IDC promoters focus less on "proving" creationism and more on rejecting evolution and redefining science to make it more compatible with their version of Christianity. IDC advocates attack evolution as a way of attacking science itself because they believe it is the foundation of materialist philosophy. This strategy is explicitly laid out in "The Wedge", a fund-raising document from the Center for Science and Culture that set forth the group's "Governing Goals":

- To defeat scientific materialism and its destructive moral, cultural and political legacies.
- To replace materialistic explanations with the theistic understanding that nature and human beings are created by God.

Although in the 1990s IDC advocates had encouraged the teaching of ID in public school science classes as an alternative to evolution, in the early 2000s they shifted their strategy. IDCs currently concentrate their efforts on attacking evolution. Under innocuous-sounding guises such as "academic freedom", "critical analysis of evolution", or "teaching the strengths and weaknesses of evolution", IDCs attempt to encourage teachers to teach students wrongly that there is a "controversy" among scientists over whether evolution has occurred. So-called "evidence against evolution" or "weaknesses of evolution" consist of the same sorts of long-discredited arguments against evolution which have been a staple of creationism since the 1920s and earlier.

For more information, visit these websites as well as <http://ncseweb.org>.

NCSE's Eugenie C Scott describes the place of IDC within the Creation-Evolution Continuum: <http://ncseweb.org/creationism/general/creationevolution-continuum>

NCSE's Eugenie Scott on IDC's claims to scientific stature: <http://ncseweb.org/rncse/21/1-2/big-tent-camels-nose>

Creationism's Trojan Horse, a website for the book by Barbara Forrest and Paul Gross, which traces the history of the IDC movement: <http://www.creationismstrojanhorse.com/>

"The Wedge at Work", Barbara Forrest's history and analysis of the ID movement: <http://ncseweb.org/creationism/analysis/wedge-at-work>

Kenneth R Miller explains "intelligent design" (on YouTube): http://www.youtube.com/watch?v=JVRsWAjvQSg>

Intelligent Design?, a special report from *Natural History* magazine, April 2002: <http://www.actionbioscience.org/evolution/nhmag.html>

"Biological Design in Science Classrooms," by Eugenie C Scott and Nicholas J Matzke: <http://www.pnas.org/content/104/suppl.1/8669.full.pdf+html>

The story of discovery of the "Wedge Document", as told by the protagonists: <http://www.seattleweekly.com/2006-02-01/news/discovery-s-creation.php>

The Wedge Document: <http://ncseweb.org/creationism/general/wedge-document>

"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: <http://ncseweb.org/store> — 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 "intelligent 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 preeminent 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 evolution and the anti-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

<http://ncseweb.org/store>

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
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.

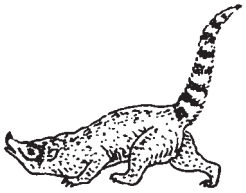
The critics en masse

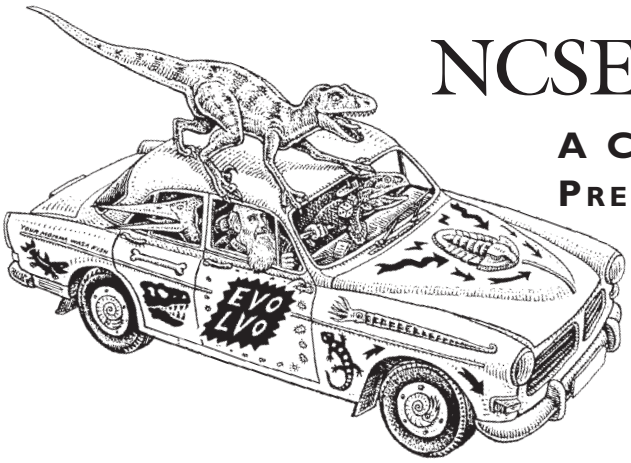
The Panda's Black Box: Opening up the Intelligent Design Controversy
edited by Nathaniel C Comfort
In his introductory essay to *The Panda's Black Box*, the editor writes, "By all means, let us teach the controversy — but not in biology class. We need the tools of the humanities to peel away the rhetoric 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 Creationism: Intelligent Design and Beyond
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, 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 Creationism: Intelligent Design and Beyond* 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 September 17, 2009
City Provo UT
Presenter Eugenie C Scott
Title What Will the Creationists Do Next?
Event Duane E Jeffery Lecture Series in Evolution Education
Time 11:00 AM
Location Brigham Young University
Contact Jerald B Johnson, jerry.johnson@byu.edu

Date September 30 , 2009
City Houston TX
Presenter Eugenie C Scott
Title The Evolution of Creationism
Event Public lecture
Time 6:30 PM
Location Houston Museum of Natural History
Contact Amy Potts, apotts@hmns.org

Visit the Grand Canyon with Scott and Gish!

Featuring NCSE's executive director Eugenie C Scott and Alan D Gishlick

Dates July 1–9, 2010

Twenty-four lucky members will raft the full length of the canyon from Marble Canyon to South Cove, experiencing one of the most beautiful and majestic natural features on the planet.

Of course, as Eugenie C Scott, NCSE's executive director, will inform the rafters, the whole Colorado plateau was laid down by the receding waters of Noah's Flood about 4300 years ago, and the Grand Canyon itself was gouged catastrophically in a matter of days. Geologist Alan "Gish" Gishlick will present the standard geological history of Grand Canyon to the rafters — and "they can make up their own minds."

NCSE's "Creation/Evolution Grand Canyon Raft Trip" is a wonderful way to learn about the creationism/evolution controversy in a fabulous natural setting.

The 2009 trip sold out early. Make reservations now for 2010!

Check the NCSE web site for updates and details — <http://ncseweb.org/ncse-events>.

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TOTAL _____

continued from page 18

path to knowledge superior to reason — an argument that can easily be directed to stress the importance of faith (though this was not Bergson's intent).

There was some irony in the fact that I was at the same time reading Erwin Schrödinger's seminal small book *What is Life?* (1945) in my scientific studies. As a physics major, I took Schrödinger seriously and Bergson as an entertaining intellectual gymnastic. While Bergson speculated about his *élan vital,* Schrödinger proceeded more parsimoniously, asking, "How can the events in space and time which take place within the spatial boundaries of a living organism be accounted for by physics and chemistry?" He continued:

> The preliminary answer which this little book will endeavour to expound and establish can be summarized as follows: The obvious inability for present-day [1944] physics and chemistry to account for such events is no reason at all for doubting that they can be accounted for by those sciences. (1945: 1–2)

In the extraordinary flowering of molecular biology that followed (and was in part inspired by him) Schrödinger's simple assertion was amply justified.

Between the publication of *Creative Evolution* in 1907 and my exposure to it in college, the Modern Synthesis had merged classical evolution with genetics. The result was a much more robust body of knowledge, resolving the basic scientific questions of evolutionary process that had troubled Bergson and played a role in motivating his thinking.

Nevertheless, the elegance of his writing sustained interest in literary if not scientific circles. By the late 1950s the metaphysical works of the Jesuit paleontologist Pierre Teilhard de Chardin, suppressed by his superiors during his lifetime, had also been published. Teilhard's thinking on evolution moved along what one might call Christianized Bergsonian lines. He perceived evolution in the cosmological as well as the biological sense as a process converging toward a final state of unity of the material (the "biosphere") and the spiritual (the "noosphere") — a state that he called the omega point (Teilhard de Chardin 1975). This point is connected theologically with the Second Coming of Christ.

There is much in this view to attract the "intelligent design" creationist. What is more, there is practical utility in the slippery possibilities of translating Bergson's key term *élan vital.* The rather odd French word *élan* can be translated into English as force, or impetus, or impetuousness, or burst, or ardor, or enthusiasm, or vivacity, or spirit. These terms run the gamut from the prosaically physical to the evidently spiritual. With such latitude, a creationist might have good hope of dodging judicial barriers to injecting religion into the science classroom without compromising his aims.

I was therefore surprised that Bergson and Teilhard has not yet popped up widely in IDC discourse (but see the discussion in Tipler 2007; though not a creationist in the typical sense, his work has influenced William Dembski). There is a passing reference to *Creative Evolution* in a short article by Discovery Institute fellow Bruce Gordon (2001). This piece predates the *Kitzmiller* decision, but it has been extensively quoted in IDC blogs since then. It is mainly a criticism of the creationist practice of sidestepping the work of doing real science and acquiring scientific credibility before heading to the K–12 classroom. However, Gordon does emphasize the "one-size-fits-all" characteristic of *Creative Evolution:*

> Design research is compatible with a realistic teleology like that of the vitalism espoused by thinkers such as Henri Bergson and [his contemporary, the embryologist] Hans Driesch. … It is compatible with a theistic-evolutionary perspective of continuous development in which the unfolding of the universe and of life was implicit in finely-tuned initial conditions. On a less sanguine note, it is logically compatible with "creationism" in a variety of forms, though many of these can readily be dismissed on well-established scientific grounds. And there may be other metaphysical possibilities.

The possibilities of using Bergson as a weapon against "Darwinism" have been apprehended in broader anti-evolution circles as well; a particularly amusing example is provided by professional philippicist Lev Navrozov in "Darwinism vs intelligent design" (<http://archive.newsmax.com/archives/articles/2006/1/12/200838.shtml>). But I was still more surprised when a discussion of Bergson's *élan vital* turned up recently in a publication by young-earth creationist (YEC) Jerry Bergman (2007). After some years of papering over their considerable differences with the IDC movement, the YECs have become much more critical of what they now see not only as an ideological rival and a hypocritical or even quasi-heretical concealment of God's hand in nature, but also as a losing strategy.

It is not clear what Bergman has in mind. His main point, which has nothing to do with Bergson's work, seems to be the frequent YEC assertion that new genetic "information" cannot appear. In making this assertion, he plays the common creationist game of quoting scientists out of context. His victims of misquotation run the gamut from distinguished biologist Lynn Margulis (2006; Magulis and Sagan 2002) to Harvard biology major Jonathan Esensten (2003). Bergman's twisting of the latter's writing is particularly amusing. In an article uncompromisingly denunciatory of creationism, Esensten says, "Evolutionary theory is a tumultuous field where many differing views are now competing for dominance." But Bergman does not continue the quotation: "…'intelligent design' cannot even be considered among possible alternatives because it fails the basic tests of any scientific hypothesis." This complete reversal of the author's meaning exemplifies the creationist practice of mis-

The concept of an élan vital… approachable by human intuition but not by reason, has an evident appeal to the ID creationist.

representing genuine scientific controversies about the fine points of evolution as a collapse of the entire science.

Furthermore, Bergman slyly slips past the fact that Bergson was not "anti-Darwinian" at all — he saw himself as supplementing rather than supplanting evolutionary theory, as is evident in the title *Creative Evolution*. Then Bergman tries to show that Bergson's newly invented "anti-Darwinism" makes creationism respectable science. He does this by insinuating that Bergson's Nobel Prize was in the biological sciences (Bergman 2007), thus justifying the subtitle "An Anti-Darwin Theory Won A Nobel." In fact, Bergson's 1927 award was in literature (<http://nobelprize.org/nobel_prizes/literature/laureates/1927/press.html>).

Though the Nobel award was not in science, the presentation speech by 1927 Nobel Committee President Per Hallström does present much potential grist for the IDC mill:

> [Bergson experiences] a liberating crisis of the soul. One can only guess that this crisis was provoked by the heavy atmosphere of rationalistic biology that ruled toward the end of the last century. Bergson had been brought up and educated under the influence of this science, and when he decided to take up arms against it, he had a rare mastery of its own weapons and full knowledge of the necessity and grandeur it had in its own realm, the conceptual construction of the material world. Only when rationalism seeks to imprison life itself in its net does Bergson seek to prove that the dynamic and fluid nature of life passes without hindrance across its meshes.

Bergman slyly slips past the fact that Bergson was not "anti-Darwinian" at all.

Today, Bergson has fallen out of prominence in the scholarly world, even in France. And his thinking never passed muster in the scientific community. More than three decades ago, the late biochemist and 1965 Nobel Laureate Jacques Monod (1972),who was indeed a scientist, had this to say about *Creative Evolution:*

> There has probably been no more illustrious proponent of a metaphysical vitalism than Henri Bergson. Thanks to an engaging style and a metaphorical dialectic bare of logic but not of poetry, his philosophy achieved immediate success. It seems to have fallen into almost complete discredit today [1970]; but in my youth no one stood a chance of passing his baccalaureate examination unless he had read *Creative Evolution.*
>
> Evolution, identified with the *élan vital* itself, can … have neither final nor efficient causes. Man is the supreme stage at which evolution has arrived, without having sought or foreseen it. … [R]ational intelligence is an instrument of knowledge specially designed for mastering inert matter but utterly incapable of apprehending life's phenomena. Only instinct, consubstantial with the *élan vital,* can give a direct, global insight into them. Every analytical statement about life is therefore meaningless, or rather irrelevant. (p 26)

The concept of an *élan vital,* comprehension of which is approachable by human intuition but not by reason, has an evident appeal to the ID creationist. Moreover, unlike the "intelligent designer", *élan vital* is depersonified — perhaps sufficiently to pass muster in the courts as a nonreligious concept. And yet for those who wish it so, *élan vital* can be seen as a divine property or even a divine manifestation.

But what about K–12 science education? The opinions of the scientific community may weigh less in this matter than the response of the courts to the simple question: Does Bergsonian *élan vital* carry a religious message? As I have noted, there is nothing *legally* wrong with teaching scientific nonsense in public school classrooms, however repellent the idea may be to those concerned with providing the next generation with a good background in the sciences. I think there is a pretty good chance that Bergson, Teilhard, and perhaps other vitalists will provide a foundation for the efforts to insert vitalism as an entrée to those classrooms that can carry religious creationist views on its coattails.

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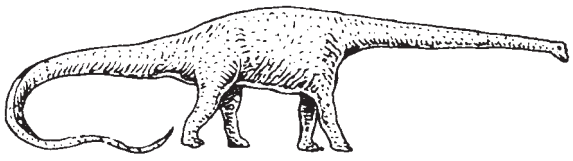

"Intelligent Design": Wave of the Future or Ghost of the Past?

Norman Sleep

"Intelligent design" creationism is the idea that our universe and particularly earthly biology are so complicated that creation by a deity is the only rational explanation. Its proponents claim to be nascent Galileos stifled by an entrenched establishment (as in the movie *Expelled*). Perhaps ironically, "intelligent design" *was* the establishment … 200 years ago. Darwin and his cohort were suckled on its concepts. Yet design as a useful scientific concept wilted beneath the harsh lights of science: logic and evidence.

The watchmaker argument is hallmark of "intelligent design": "If we find a watch there much be a watchmaker." It formed the centerpiece of *Natural Theology* (1802; Paley 2008) of William Paley (1743–1805). Paley's watch was no mere timepiece. It was a self-replicating automaton, a consortium of machines. He correctly reasoned by analogy with life that an automaton could reproduce without being aware of its existence, its original fabricator, or even the functions of its component parts. He had no need to cherry-pick examples. Life does show a highly ordered complexity that successfully facilitates its reproduction. The *appearance* of design is ubiquitous; descriptive words for organisms connote it: for example, "body parts", "body plan", "skeletal structure", and even "creature" in its literal meaning.

Natural Theology, despite its name, consists of descriptive natural history that would later fuel Darwin. Scripture makes a cameo appearance only at the end of his book, which in its day served to interest people in science. Today, it documents the worldview of sincere early scientists struggling with meager information and nascent theory. Paley in practice shared more with modern science than with the professional creationists who have resurrected a debased form of his ideas as part of a cynical "Wedge Strategy".

Just who was Paley? His worldview arose from the science and technology of his time: the start of the industrial revolution. Innovators put mechanical energy to beneficial tasks. Anatomists understood human and animal bodies as complex machines with pulleys and levers. Chemistry was becoming a science; anatomists appreciated that life involved complex chemistry of which they were still largely ignorant. Paley overtly eschewed chemistry in his book for this reason.

The major lacuna in science in 1800 was geology. Next to nothing was known about geological time. The only "old earth" theory available to Paley was Buffon's idea that a comet crashed into the sun and ejected the planets as red-hot masses that subsequently cooled. When Paley corresponded with astronomers to obtain an understanding of planetary orbits, he learned that the idea simply does not work; the orbit of an ejected object returns to the surface of the sun rather than to a circular distant orbit (Paley 2008: 206).

What was Paley's attitude towards an old earth? "It is easy to say this; and yet it is still true, that the hypothesis [of gradual biological change over vast periods of time] remains destitute of evidence" (Paley 2008: 227). "[I]f not in a million of years, perhaps in a hundred millions of years, (for theorists, having eternity to dispose of, are never sparing in time,) [for creatures] to acquire *wings*" (Paley 2008: 224, emphasis in original). Paley made no reference to speculation on the duration of any geological process. Casual application of geology may well lead one to a young earth. In his time it was known that the inland and coastal landforms of England had been shaped during a glaciation period a few thousands of years earlier, so application of that geological knowledge supported the inference of a young earth. Paley's comparison of a stone having always been in a road with a watch requiring manufacture (Paley 2008: 7) and his remarks that the Creator had no "useful purpose" to mould mountains into "Conic Sections" (Paley 2008: 43) reflect his young-earth mindset.

Paley went to much effort toward refuting the evolutionary theory of his time. The ideas of use-and-disuse evolution and goal-driven evolution were prevalent. Paley doubted that there was enough time for them to act, brought up the lack of evidence of ongoing change, and invoked the creationist staple: if pouches are useful to pelicans, why haven't many more birds evolved them (Paley 2008: 227)? His only other alternative to creation was that given "infinite age" the current situation would arise. He astutely surmised that this concept explained nothing. He did recognize observations that became pillars of natural selection, especially that far more young are born than can survive (Paley 2008: 247–50).

Paley devoted a full chapter to comparative anatomy. He began with Arkwright's mill for spinning cotton. By the time of his book, the contraption had evolved into devices for spinning wool, flax, and hemp. Yet Paley did not recognize this progression as an exam-

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William Paley, 1743–1805

"There cannot be design without a designer."

Arguments involving timekeeping instruments have been common throughout the history of the creationism/evolution controversy. For example, in 45 BCE Roman philosopher and orator Marcus Tullius Cicero (106–43 BCE) — an early advocate of "intelligent design" (ID) — claimed in *The Nature of the Gods* that "when you see a sundial or a water-clock, you see that it tells the time by design and not by chance. How then can you imagine that the universe as a whole is devoid of purpose and intelligence?"

In 1681, Thomas Burnet's (1636–1715) *The Sacred Theory of the Earth,* which founded scriptural geology (by trying to reconcile Scripture with geology), relegated God to the part of a playwright instead of a direct actor. Burnet used an analogy involving a clockmaker to argue that God's role in nature is indirect: "We think him a better artist that makes a clock that strikes regularly every hour from the springs and wheels which he puts in the work, than he that hath so made his clock that he must put his finger to it every hour to make it strike."

A decade later, John Ray — whose work set a pattern for European science for more than almost two centuries — discussed the relationship between God and nature in *The Wisdom of God Manifested in the Works of Creation*. Ray, who believed that adaptations are permanent traits designed by God, claimed that organisms have no history; they have always been the same, lived in the same places, and done the same things as when they were first created. Ray argued that a clock shows evidence of a designer, and since nature is more perfect than a clock, then nature must also include a master designer.

In 1696, English clergyman and natural philosopher William Derham's (1657–1735) *The Artificial Clockmaker* presented a teleological argument for the existence of God. In 1754, German philosopher and deist Hermann Samuel Reimarus's (1694–1768) *Principal Truths of Natural Religion* rebuffed Epicurean criti-

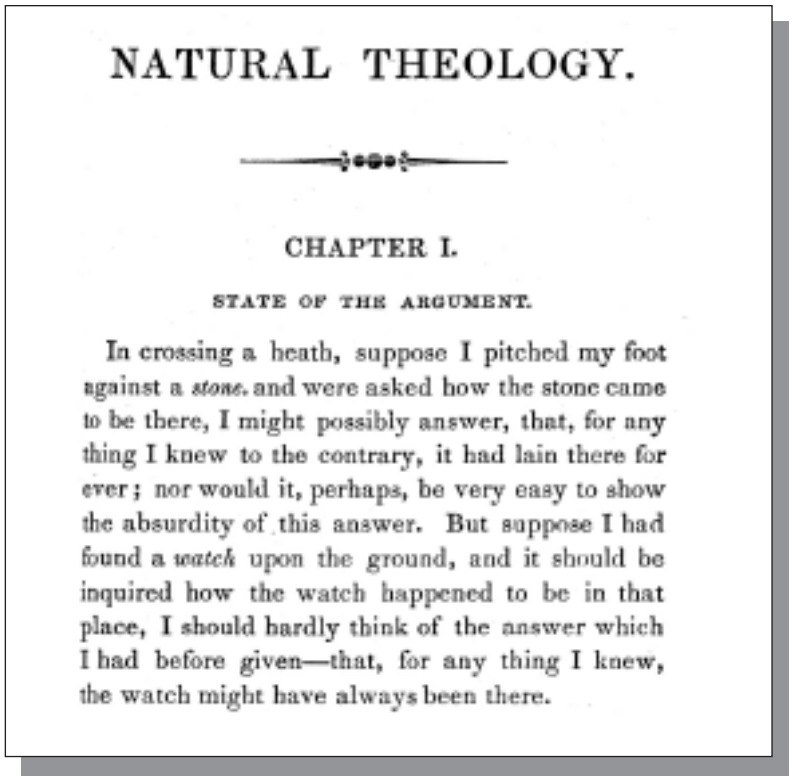
ple of descent with radiation and modification. Rather, given the lack of time available for biological change, he credited both Arkwright and the Creator with an "economy" of design where a single invention worked remarkably well for numerous purposes.

Geology became a science shortly after Paley's death, providing the evidence he lacked. James Although Hutton's old-earth geology was published in 1788, John Playfair's popularization *Illustrations of the Huttonian Theory of the Earth* did not appear until 1802 along with Paley's work. The Geological Society of London was founded after Paley's death in 1807. William Smith's geology map gave raise to the paleontological time scale. By the publication of the *Origin of Species* in 1859, it was patently evident that geological time is vast and that the fossil record shows a sequence of increasingly modern forms, with a lot of extinctions on the way. The evolution of vertebrates from a common ancestor with a backbone explained their obvious similarities. We do not find unworkable organisms for the simple reason that they would not emerge in the first place and would die out if they did. The rapid change of domestic animals and plants by artificial selection provided analogy to the slower change by natural selection.

After Darwin, geologists and biologists abandoned recourse to divinity and the search for higher purposes as *unproductive*. Any conceivable observation can be attributed to divine intervention and, like saying the present state of affairs will arise given infinite time, nothing is actually explained. Yet the implications of the mother of all sampling biases did not sink in until the space-age interest in astrobiology. We have to be here to observe. No event incompatible with our collective or your personal existence can have occurred. Philosophers of science call this concept the weak anthropic principle. As a successful wide-ranging species, we see the illusion of providence; personally we experience the illusion of miracles if we survive in especially trying circumstances.

Several of Paley's providence arguments can be turned into still unresolved "rare earth" or "rare universe" arguments, especially in his chapters on astronomy and the elements. The earth's orbit is nearly circular and the mild and stable tilt of its axis gives rise to modest seasons. There are no giant planets near the sun that would make its orbit unstable. There is the right amount of water to get oceans and dry land. Water has properties that make it an excellent biological fluid. Newton's laws and physics in general work out so that planetary orbits can be stable.

There is no way that the earth and its inhabitants in their present state could have been formed in a few thousand years by natural processes, so in order to insist on a young earth, it is necessary to have recourse to the supernatural. Paley (2008: 26–7) allowed supernatural processes for creation but rejected overt deviations from the general



NATURAL THEOLOGY.

CHAPTER I.

STATE OF THE ARGUMENT.

In crossing a heath, suppose I pitched my foot against a *stone*, and were asked how the stone came to be there, I might possibly answer, that, for any thing I knew to the contrary, it had lain there for ever; nor would it, perhaps, be very easy to show the absurdity of this answer. But suppose I had found a *watch* upon the ground, and it should be inquired how the watch happened to be in that place, I should hardly think of the answer which I had before given—that, for any thing I knew, the watch might have always been there.

Figure 1. William Paley's Natural Theology *was his era's most famous exposition of the argument from design. Like earlier advocates of the argument from design (for example, Cicero and John Ray), Paley used an analogy based on a time-keeping instrument (in Paley's case, a watch).*

laws of physics. This history is a prime example how the unscientific practices of invoking divine intervention and seeking purposes in nature were phased out and how science consigns constructs into the dustbin as new evidence becomes available. Paley in part acted like a modern scientist. He gathered the available data and consulted with experts. He willingly and correctly examined Buffon's hypothesis with physics, not Scripture. His young-earth constructs arose from the lack of evidence for an old earth.

There is a good analogy between Aristotle's unchanging geocentric heavens and Paley's young earth populated by unchanging species. Both constructs started with valid observations: we all sense *terra firma* and well functioning organisms in our daily lives. Paley's examples of designed contrivances became Darwin's examples of evolutionary adaptation, much as well-documented geocentric epicycles were transformed into heliocentric orbits. Galileo pointed out forcefully throughout the *Dialogue* that Aristotle lacked evidence, including the appearance of "new" stars that pointed to changeable heavens and telescopic observations that supported the Copernican system; Paley lacked our vast knowledge of geology and molecular biology. With regard to K–12 instruction, we do not hide the existence of geocentric astronomy from students; we should not conceal that biology began as a study of design and a search for God's plan. The movement away from that emphasis was not a matter of rejecting theological positions as much as it was embracing scientific ones.

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cisms of ID. Reimarus transformed Ray's metaphor involving a clock into one involving a watch, thereby setting the stage for the well known argument of William Paley, the most famous advocate of ID.

William Paley was born in Peterborough, England in July 1743. Paley graduated from Cambridge first in his class in 1763, became a deacon in 1765, and was appointed assistant curate in Greenwich. Paley taught at Cambridge for ten years. He was ordained in 1767 (after earlier earning an MA), and the remainder of his clerical career included successively more influential positions within the Anglican Church. Paley opposed slavery and advocated prison reform, and as a philosopher, was a utilitarian, believing that humans act morally to increase their overall level of happiness. In 1776, Paley married Jane Hewitt, with whom he had eight children.

Paley was a popular preacher and one of England's most important theologians of his generation. He published his Cambridge lectures in *The Principles of Moral and Political Philosophy* (1785), which outlined his utilitarianism and was used as a textbook at Cambridge for many years. This was followed by *A View of the Evidences of Christianity* (1794), which was a response to David Hume's skepticism of religion and, in particular, Hume's dismissal of miracles. But Paley's best-known book, and the last before his death, was *Natural Theology; or, Evidences of the Existence and Attributes of the Deity, Collected from the Appearances of Nature* (1802).

In *Natural Theology*, Paley — one of the most admired clerics in the English-speaking world — argued that God could be understood by studying the natural world. *Natural Theology* begins

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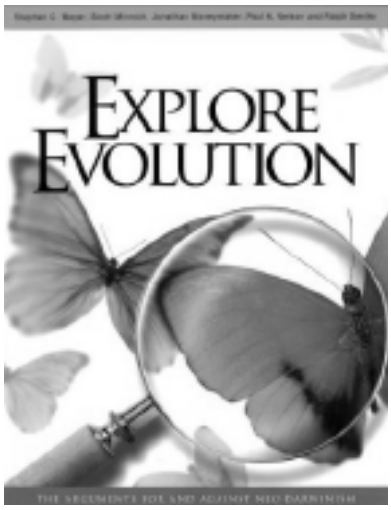
BOOK REVIEWS

LOST EXPLORERS?

EXPLORE EVOLUTION: THE ARGUMENTS FOR AND AGAINST NEO-DARWINISM

by Stephen C Meyer, Scott Minnich, Jonathan Moneymaker, and Paul A Nelson
Melbourne, Australia: Hill House Publishers, 2007. 160 pages

[*This review essay is adapted and excerpted from John Timmer's blog. The original piece can be found at <http://arstechnica.com/science/news/2008/05/evolution-whats-the-real-controversy.ars>.*]



Regular readers of *RNCSE* will be well aware of the Discovery Institute's intention of altering science education in a way that introduces "intelligent design" or limits the discussion of evolution. After the Dover decision limited their options, a new focus emerged: have schools teach the "strengths and weaknesses" of evolution, which will allow those so inclined to emphasize the weaknesses in a way that raises doubt about the theory in general. To help with this approach, a number of Discovery Institute fellows have produced a book entitled *Explore Evolution*.

INQUIRY-BASED NONLEARNING

The authors face at least one very significant challenge: the scientific community overwhelmingly accepts evolution because its strengths far outweigh its weaknesses. Taking on the strengths runs the risk of emphasizing their significance, so *EE* maneuvers its way around this roadblock by invoking an approach to teaching called inquiry-based learning (IBL).

The book is divided into a number of individual topics. For each topic, cases for and against standard science are presented, and then a discussion switches back and forth between the two perspectives. No conclusions about the weight of the evidence are ever provided.

Although this is supposed to represent an opportunity for inquiry-based learning, there are two obvious tactical reasons for avoiding conclusions. The authors know precisely the sort of conclusions they would like everyone to

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with the famous metaphor of God as watchmaker (Figure 1). Paley argued that the only rational conclusion is that the watch "must have had" a designer. Much of *Natural Theology* discusses examples of purported design in nature, with many drawn from Paley's own observations, and likely to be familiar — and therefore persuasive — to readers. Paley's designer was his watchmaking God.

Charles Darwin read *Natural Theology* while at Cambridge, and was encouraged by his instructors John Henslow and Adam Sedgwick to accept Paley's perspective. Darwin recalled that Paley's work, including *Natural Theology*, "was the only part of the academical course which, as I then felt and as I still believe, was of the least use to me in the education of my mind." When Darwin boarded the *Beagle*, he accepted design in nature. However, after discovering natural selection, he felt differently: "The old argument of design in nature, as given by Paley, which formerly seemed to me so conclusive, fails, now that the law of natural selection has been discovered."

Virtually all biologists have similarly rejected Paley's argument. The most famous of these refutations is Richard Dawkins's *The Blind Watchmaker* (1986), whose title refers to Paley's metaphor. Dawkins agrees that there is a watchmaker, but otherwise concludes that Paley is "gloriously and utterly wrong." The watchmaker for Dawkins (and for contemporary biology) is natural selection. Biologists view the evolution of complexity and apparent design, therefore, simply as the result of the cumulative process of repeated generations of differential reproduction. Dawkins's book motivated Phillip Johnson to write *Darwin On Trial* and to become active in the ID movement. Although proponents of ID claim that their premises differ from Paley's, and, unlike Paley, do not specify who or what the designer is, most evolutionary biologists see ID as a version of Paley's arguments updated to account for advances in our understanding of biology.

Soon after finishing *Natural Theology*, Paley suspected that his death was imminent, and he assembled his sermons to be published posthumously and given to anyone "likely to read them". Paley died on May 25, 1805, and was buried in the Carlisle Cathedral, next to his wife.

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reach: some variation of creationism. They are also undoubtedly aware of survey results that indicate that well over 10 percent of US teachers "teach creationism as a 'valid scientific alternative to Darwinian explanations for the origin of species'" (Berkman and others 2008). By avoiding any conclusions, *EE* will allow those teachers to lead their students into this conclusion while providing them, and the Discovery Institute, with plausible deniability.

But the "divide and conquer" approach has a consequence. As the book switches back and forth between perspectives and quickly changes topics, what gets completely lost is the internal consistency — the consilience — among the different lines of evidence. The molecular, cladistic, and fossil evidence agree on the derivation of whales, birds, tetrapods, and other evolutionary transitions. But *EE* presents them separately, attacking each in isolation. One of science's great strengths is the ability to create a coherent understanding from disparate lines of evidence. One of the hardest tasks faced by science teachers is to weave the lines of evidence together for students, so that they can appreciate just how many phenomena a major theory ties together. By attacking these lines of evidence separately, it is easier to view the fact that any one of them supports evolution as a lucky fluke (and the authors suggest precisely that). This makes the hardest job of a teacher that much harder.

John got a Bachelor of Arts in Biochemistry (yes, that is *possible) from Columbia University, and a PhD in Molecular and Cell Biology from the University of California, Berkeley. He has done over a decade's worth of research in genetics and developmental biology at places such as Cornell Medical College and the Memorial Sloan-Kettering Cancer Center. In addition to being* Ars Technica's *science content wrangler, John still teaches at Cornell and does freelance writing, editing, and programming, often with a scientific focus. When physically separated from his keyboard, John tends to respond by seeking out a volleyball court, bicycle, or a scenic location for communing with his hiking boots.*

Building the tree of life

Darwin's *Origin of Species* proposed a mechanism by which a selective pressure, acting on inherited variations, could transform a single species or bifurcate it into two distinct species. Reasoning that there was no inherent limitation to this branching process, Darwin's single illustration in the book was a tree, all species derived from a single trunk. Darwin concluded that life had been initially breathed, "into a few forms or into one," and all current species were derived from that event.

Darwin's conclusion has been spectacularly confirmed in the 150 years since. The basic biochemistry of the cell is shared by all known organisms, a fact that supports a common origin, while everything from fossil evidence to modern genomic sequencing has supported the tree-like pattern of common descent within the animal kingdom. There are some scientific debates remaining — some argue that horizontal gene transfer has created a web of life at the microbial level — but scientists do not debate the general outlines of limited origins and organisms related through descent from a common ancestor (see a discussion of this scientific debate at <http://arstechnica.com/science/news/2008/05/breaking-the-tree-horizontal-gene-transfer-and-phylogeny.ars>).

But *EE*, in seeking to present a case against evolution, argues that there are viable alternative models. It favors what it calls an "orchard model," one in which there are many origins of life. In the orchard, current species are the product of severely restricted variation from an undefined number of origin events. That undefined number appears to be very, very large, as any time a problem with evolution is discussed, a separate origin is the implicit or explicit alternative. If that sounds familiar, it should — it is essentially biblical special creation of kinds.

So has creationism's orchard model achieved a sudden surge in scientific attention? Turning to PubMed, a database of 18 million scientific publications, the answer is no. There is a lot of agricultural literature on orchards, so I searched for "orchard" occurring in the same paper as "evolution." That netted 22 references on the evolution of crop plants and their pests, and three papers on evolution originating at institutions located on roads named after orchards. The more technical term for multiple origins, polyphyletic, pulls out a significant number of papers, but they seem to focus on specific *features* that have multiple origins, such as flightlessness in birds, rather than on the proposition that individual species have multiple origins (see a discussion of the ancestry of flightless birds at <http://arstechnica.com/science/news/2008/09/ancestors-of-ostriches-others-say-fuhgetaboutit-to-flight-not-once-but-thrice.ars>). "Orchard model" was easy to find by using Google; however, the "hits" return sites such as Answers in Genesis.

Leaving aside the whole choice of "orchard" and its implications of intelligent intervention, how can biblical creation possibly be presented as a viable scientific model, or the tree of life as so controversial that the orchard might actually be preferred to it? Very carefully, as it turns out.

What if we had a controversy and no one showed up?

EE's authors manage the feat of making well studied science appear muddled by using a variety of approaches. In part, they rely on what I call the "find-a-PhD" approach: if you look hard enough, you can find someone with a PhD who is willing to say anything. One of the triumphs of recent years has been the elaboration of fossil evidence that reveals the transition between lobe-finned lungfishes and tetrapods (see a discussion at <http://arstechnica.com/science/news/2008/06/evolutionary-change-in-the-era-of-the-fishapods.ars>). But Malcolm Gordon of UCLA has noted that the fossils were found at sites that were widely separated and concluded that there may have been a couple of distinct origins of tetrapods (Long and Gordon 2004). There are a number of serious problems with citing Gordon's work as evidence for the orchard

model. The first is that Gordon appears to be essentially the only person in the biological community that holds this opinion, meaning that this is not actually a scientific controversy of any significance. More problematic, however, is the fact that Gordon recognizes that the origin of tetrapods occurred over 25 million years through evolutionary descent from a common ancestor. Yet somehow, his argument over a single detail has been portrayed as if it raised questions about evolution in general.

Another PhD the authors found is Christian Schwabe, who studies a protein called relaxin. But he also publishes papers in which he argues in favor of his belief that the genomes of all modern and extinct species originated during the formation of life billions of years ago. According to Schwabe, those genomes have continued to exist, hidden underground as stem-cell–like entities. Whenever these cells sense a favorable environment above ground, they head for the surface and self-organize into a fully formed, multicellular animal. No, I am not making this up. This is not *simply* evidence-free (although it is); it is borderline deranged and certainly nothing students should be taught. And yet, in the hands of *EE*'s authors, it is presented as a serious scientific controversy about the existence of the tree of life. These are not scientific controversies; they are not part of a coherent scientific case that can be made against evolution. They are actually opinions that have barely registered within the wider scientific community.

EE's arguments also ensnare a number of other scientists. Carl Woese is famous for having identified the Archaea, but he also appears in *EE*'s footnotes as part of the case against a tree of life. Woese has argued that the division between nonliving chemistry and life should be drawn later than others do, and he places this division after the Archaea, Bacteria, and Eukaryotes had diverged. As a result, he posits three origins of cellular life, although his argument partly hinges on how one defines life, rather than some objectively apparent biological property.

In *EE*, those three origins of life become indistinguishable from the many, many origins required for the orchard model. Woese, in fact, is grouped in the footnotes with Schwabe, who is arguing for what is essentially an unrelated idea. This sort of presentation is pervasive in *EE*, and it is worth commenting on three aspects of it. The first is *EE*'s use of what could be called "borrowed credibility". Carl Woese is a serious and significant scientist who has contributed to our understanding of the history of life; Christian Schwabe is not. By lumping them together in a single footnote, the authors attempt to transfer some of Woese's credibility to the evidence-free inanity that Schwabe publishes.

The second thing worth mentioning is that, like the universe, real biological controversies appear to undergo an inflationary stage within the book. There are a number of different ideas regarding the origin of the Archaea, from Woese's distinct origin to a proposal from Thomas Cavalier-Smith, who suggests that the Archaea are a later offshoot of bacteria (see a discussion at <http://arstechnica.com/science/news/2008/05/exiting-the-rna-world.ars>). All of the proposals, however, exist within an *evolutionary* framework with a *limited* number of origins-of-life and organisms that are related by common descent. Somehow, these arguments over the details are inflated to the point where they encompass controversies that do not exist in the scientific community, such as the plethora of origins required in the orchard model.

This presentation can also be considered a "bait and switch" — describe a real scientific controversy, then substitute in the controversy you would like the readers to think exists without comment. This is obvious in the section on the fossil record, where the Reply section contains a long list of academic discussions of the limitations in our collections of fossils. That section wraps up by claiming these limitations, "have led some scientists to doubt that the fossil record supports the case for common descent."

Who are those scientists? Well, poor Malcolm Gordon (who actually wrote in favor of common descent) is cited, but the rest are not actually scientists, nor are their publications peer-reviewed science. Instead, there is a book by an Italian creationist and another by Discovery Institute Fellows, including some of *EE's* authors. The bait of real issues has been switched to a statement that is not actually supported by the footnote.

Pruning the tree of life

Not content to build up a case for the orchard through spurious reasoning, *EE* attempts to tear down the tree of life, or at least to prune it radically. The authors have a simple solution in mind: if you break the branches that connect species, then the tree of life looks a bit more like their favored orchard. Unfortunately for the Discovery Institute, biologists have very good reasons for drawing specific connections on phylogenetic trees. In Darwin's time, these connections were based on morphology and sporadic instances of fossil evidence. Modern biology has changed all of that. It has rigorously applied cladistic methods to construct robust trees based on collections of shared characteristics. No description of cladistic methods appears at all in *EE*.

In recent decades, those cladistic trees have been reinforced and extended by molecular data. Here, *EE's* arguments follow an inflationary model: problems with a studies based on a single protein are used to suggest that no molecular trees can possibly be trusted. The fact that we now produce trees based on entire genomes is not apparently deemed worthy of mention.

Finally, in an increasing number of cases, scientists have individual fossils that provide evidence of key evolutionary transitions. *EE* accepts that one of these, *Archaeopteryx*, exists, but it argues that its existence is meaningless — it could just be a lucky fluke. None of the other fossils on either side of the transition to flight are deemed worthy of mention. A few other examples of well-characterized transitional fossil series — for example, land mammal to whale, fish to tetrapod — are mentioned in the book, but they are all treated in isolation so that they can be individually dismissed as exceptions. The fact that

there is an increasing number of these series is handled simply: even if they *are* real, there still are not *enough* of them.

Missing reality

In addition to the major problems with the approach taken by the book, questionable information, inaccuracies, and distortions are pervasive. It is worth providing a flavor of some of them.

For example, biogeography, which relates the distribution of species through evolution and migrations enabled by past geological configurations, provides one of the strongest evidence for evolution and led Alfred Russel Wallace to an independent formulation of the theory. *EE* gets basic facts wrong by suggesting that marsupials are pervasive in Australia because they originated in isolation there. Instead, evidence suggests that placental mammals originated after Australia was isolated and later outcompeted most marsupials on the other continents. With the basics wrong, *EE* suggests its favorite conclusion — marsupials get their own trees in the orchard (based on a fact that is consistent with evolution: opossums exist in North America). Also unmentioned in this specific case is the completion of marsupial and monotreme genomes, which clearly retain features of reptilian ancestors and contain a partial complement of mammalian novelties, exactly as would be predicted based on evolution (see discussion at <http://arstechnica.com/science/news/2008/05/platypus-genome-as-distinctive-as-its-owner.ars>). In the end, *EE* dismisses all of biogeography. Sure, evolution *could* explain the distribution of species, the authors admit. But, since they do not mention the geological, fossil, morphological, and molecular evidence, they find it easy to claim that the orchard model works just as well.

EE frequently fixates on the sudden appearance of some species in the fossil record. For example, it portrays the Cambrian explosion as an insurmountable problem for evolution and common descent. This ignores the fact that the standard, branching tree of evolution accounts for the appearance of major animal groups within the Cambrian. *EE*'s illustration of life in the Cambrian as a series of unconnected lines is simply false.

Elsewhere, the book argues that, "the first fossil bat appears suddenly." But this year, an early fossil bat species was discovered, one that has short wings and claws at the end of its digits adapted for climbing (see <http://arstechnica.com/science/news/2008/05/platypus-genome-as-distinctive-as-its-owner.ars>). This primitive bat species highlights the problem with this entire class of arguments, which attempt to rule out evolution by assuming that something (such as a bat ancestor) will never be discovered.

EE also spends time critiquing information found in textbooks and museum displays. It should surprise no one that inaccuracies in graphical representations of science exist. But those are no reason to assume that the science behind them is faulty. The equivalent logic would suggest that, because *EE*'s supposed picture of the Galápagos Islands centers on the Yucatan Peninsula, we can conclude that geographers have things all wrong.

These sorts of logical flaws are pervasive. In one section of the book, the authors argue that scientists are questioning the dinosaur–bird transition, but once again its footnote references a book published by an author that was a Discovery Institute fellow. The text then focuses on the lungs and, unbelievably, notes that evidence suggests that the distinctive avian lung configuration had appeared in dinosaurs. This is not much of a surprise; feathers and other avian "innovations" are now known to predate birds by millions of years. But it is actually evidence that runs counter to the original contention: that the dinosaur–bird transition is the subject of scientific controversy.

Rehashing old favorites

The text of *EE* assiduously avoids any mention of "intelligent design" or creationism, but anyone familiar with the literature of these movements will recognize that their ideas pervade *EE*. These go beyond the obsessive focus on problems with the fossil record and the repackaging of special creation. An entire section of the book is devoted to Discovery Fellow Michael Behe's contention that complex, multiprotein systems cannot evolve, a concept called "irreducible complexity". Again, PubMed reveals no significant presence of this concept in the scientific literature. There are 18 papers, only three of which address it directly; all of them conclude that "irreducibly complex" systems can evolve. Indeed, scientists have proposed at least three mechanisms by which this can happen, any one of which invalidates Behe's. *EE* mentions only one of these, and again concludes that nobody really knows what is going on.

EE also covers other arguments that have pervaded creationist literature: there are things called microevolution and macroevolution, and the authors are willing to accept microevolution (the branches of the orchard) while contending that macroevolution is impossible. In a book that is supposed to be about evaluating evidence, there is a curious silence: nothing is said about how to identify what constitutes microevolution or what the biological basis for its limits are. The footnotes simply register the scientific debate over whether evolution ever occurs through anything other than the gradual accumulation of minor changes.

Any discussion of the details of the orchard model appears to be off-limits. IBL, remember, is supposed to involve an evaluation of evidence, but nothing is ever said about any biology behind the origin of new trees in the orchard. Despite its pervasive appearance in the book, where it is suggested as an alternative whenever a problem with evolution is supposedly identified, the orchard is apparently not to be subjected to any inquiry.

These sorts of grand, unsupported claims are ubiquitous in creationist literature, and *EE* follows this line of attack against evolution precisely. If it never mentions creationism or "intelligent design", the decision to avoid doing so appears to be strategic, rather than intellectual: it would only cause trouble if the book gets into a school system.

Ready for a science class?

Collectively, these problems ensure that anyone using *EE* in science classrooms will leave their students with a picture of modern biology that is essentially unrelated to that of the biological science community. Its logical inconsistencies and lack of conclusions will leave students bewildered about the nature of scientific reasoning.

As I was reading the text, I was repeatedly reminded of the testimony of Berkeley's Kevin Padian, who described the statement required by the Dover (PA) school board as follows:

> I think it makes people stupid. I think essentially it makes them ignorant. It confuses them unnecessarily about things that are well understood in science, about which there is no controversy ... about a broad body of scientific knowledge that's been developed over centuries by people with religious backgrounds and all walks of life, from all countries and faiths ...

But the book does not only *promote* stupidity, it demands it. In every way except its use of the actual term, this is a creationist book, but its authors are expecting that legislators and the courts will be too stupid to notice that, or to remember that the Supreme Court has declared teaching creationism an unconstitutional imposition of religion. We can only hope that legislators choose not to live down to the low expectations of *EE's* authors.

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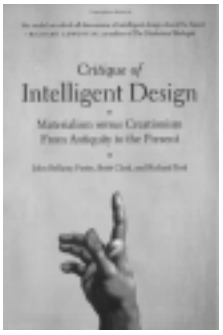
Critique of Intelligent Design: Materialism versus Creationism from Antiquity to the Present

by John Bellamy Foster, Brett Clark, and Richard York
New York: Monthly Review Press, 2008. 240 pages

Reviewed by Arthur McCalla



The great merit of this book is its authors' recognition of historical contingency as key to the battle over "intelligent design". They argue that every natural and social science originated in a materialist (in the sense of naturalist) critique of some version of "intelligent design" and its accompanying teleological explanation. Proponents of "intelligent design" throughout the ages, in turn, have attacked materialism for its rejection of design and teleology, resulting in a 2500-year dialectic between scientific materialists and their theological and philosophical opponents. The authors further note that whereas the history of this conflict is well known to present-day creationists (the young-earth creationist Henry Morris referred to it as "the long war against God" and it receives prominent exposure in the Wedge document of the "intelligent design" proponents affiliated with the Discovery Institute), it is little known among defenders of science. The authors' intent in writing this book is to add to the armory of opponents of creationism by reconstructing this "long critique of design, which was so integral to the development of science in all its forms" (p 28).

After introductory chapters setting out the purpose and scope of the book and reviewing the Wedge strategy (chapters 1–2), the authors get down to their twofold main work. First, they present a series of chapters depicting how specific natural and human sciences could be brought into existence only by means of their founders' rejection of "intelligent design" (chapters 3–7); next, they reflect on the nature of historical materialism and its relevance to human well-being in light of the present-day controversy over "intelligent design" (chapters 8–10).

The authors begin their first task by noting both that creationist views predate Christianity and that the argument from design was itself developed as a reaction against the materialist theories of ancient Greek atomists. Their chapter on the ancient Greeks quickly focuses on Epicurus — the archenemy of creationists through the ages and therefore the hero of the authors' counterhistory. Ancient Epicurean materialism was a philosophy of both nature and society. Its atomist universe evolves, driven by contingent occurrences (the famous Epicurean swerve), into greater complexity, while human society, freed by philosophy from fear of divine caprice or fatalist submission to mechanistic determinism, develops in the direction of greater freedom and happiness. Epicurus thus becomes the figure of the liberator of humanity from superstition and establishes the authors' fundamental contention that the struggle against "intelligent design" is a struggle not only for scientific truth but also for human freedom.

The following chapters identify the revival of Epicureanism as a major influence on key thinkers of the Scientific Revolution and the Enlightenment, and then discuss more fully Marx, Darwin, and Freud. Of Darwin, little need be said here, except that the authors usefully remind us that it was Darwin himself who gave us the term "intelligent design" in its modern sense as the position which his theory of evolution by natural selection was intended to overthrow. Marx is the intellectual center of the book —

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the authors write from an enlightened Marxist perspective — and the chapter devoted to him presents Marx as the principal nineteenth-century scholar of Epicurus and interprets his accomplishment as a parallel attempt to dismantle both religious teleology and mechanistic determinism in order to construct a materialist philosophy of both nature and society that would free humanity from irrationalism and injustice. The very existence of a chapter on Freud is interesting, given the often bitter rivalry between Marxists and Freudians in the twentieth century. And indeed it is not at all certain that the authors regard psychoanalysis as a science; one suspects that Freud receives a chapter only because he is prominently attacked by creationists. In any case, in culminating with Freud's philosophical assessment of religion as an illusion that conflicts with science, the chapter underlines the common theme of materialist thinkers from Epicurus onwards: science liberates humanity from bondage to the unreason of religion.

In what I have designated as the second part of the book, the authors distinguish contingency from randomness and celebrate it as the substrate of human freedom. Proponents of "intelligent design" pursue an either/or strategy, according to which we must choose between understanding the world to be the result of blind chance or of a superior Intelligence; and since the complexity of the world rules out the former, the latter is left as the more reasonable explanation. The authors expose the hollowness of this strategy by explaining carefully that what it (deliberately) omits is the understanding of the world that is in fact that of modern science: the world is the product of contingency operating along historically and structurally conditioned pathways; as such, natural and social history is governed by natural forces independent of either design and purpose or mechanistic determinism. The authors' demonstration draws heavily on the work of Stephen Jay Gould and his various collaborators (and one detects below the surface of the text the authors' engagement in side-debates within modern evolutionary biology concerning the tempo of evolution and the relation between formalism and structuralism in biology).

"Intelligent design" is, of course, the thin end of a wedge, the thick end of which is the reactionary social, cultural, and political program of the Christian right. Here again, the arguments of its proponents turn on an either/or choice: either the universe is designed by a supernatural Intelligence or there can be no meaning or morality to human life. Once more, the authors explain how the historical materialist notion of contingency provides a way out of this suffocating dualism. History is open-ended in the sense that human actions are one of the forces that will shape it. Humans have the freedom to participate in the construction of meaning.

Readers may wonder if this book is the thin end of a Marxist wedge. While the authors are committed to historical materialism as a revolutionary project for humanity, and while they assert that the conflict between religion and science is insurmountable within the present social order, their commitment is to a historical materialism stripped of the determinism of vulgar Marxism and in which Darwin is as important as Marx. My only significant reservation regarding this useful and thoughtful book is that historiographically it is insufficiently radical. The authors themselves cite the Hegelian dictum that "contraries belong to the same genus" underlying Marx's contention that atheism is simply the inversion of theology and therefore not a radical break with a religious way of thinking (p 97, quoting Thomas Dean's *Post-Theistic Thinking: The Marxist-Christian Dialogue in Radical Perspective*). In simply inverting the creationists' "long war against God", the authors endorse their either/or way of thinking. The role of religion in the history of science, we may suspect, is more complex and ironic than either side suspects.

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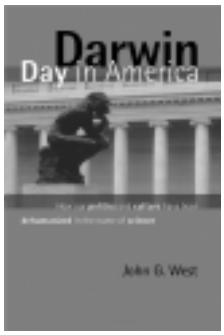
Darwin Day in America: How Our Politics and Culture Have Been Dehumanized in the Name of Science

by John G West
Wilmington (DE): Intercollegiate Studies Institute, 2007. 495 pages

Reviewed by Mark E Borrello



In *Darwin Day in America*, John G West — the associate director of the Discovery Institute's Center for Science and Culture — blames all of what he deems to be the ills of modern society on a construct he calls "Darwinism," which throughout the book is roughly equated with "scientific materialism." If there has been a negative cultural development, West will most certainly find Darwinism as its source. If there is an institution or idea that appeals to his sensibilities, however, he will take great pains to distance it from any taint of Darwinian influence. This is quintessentially bad scholarship.

In the chapters dedicated to crime and punishment (chapters 3–5), West goes on at length cataloging and ridiculing the attempts of late nineteenth- and early twentieth-century researchers investigating the material basis of human behavior. All of the usual suspects are rounded up (Darrow, Lombroso, Freud, and Skinner among others) and quote-mined to fit West's indictment. According to West, of course, they are all operating under the thrall of Darwinism and are responsible for undermining everything that makes us human — most especially personal responsibility and free will (both of which we are endowed with by the Creator).

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The result of all of this work, West concludes, is that the medicalization or scientization of criminal behavior has stripped our culture of the right to mete out punishment according to the dictates of what West vaguely refers to as the "Western conception of criminal justice" (p 73) or the "cultural foundations of the traditional theory of punishment" (p 78) — read Old Testament. According to West, our attempts to discern the material basis of human behavior have led us too far down the path of treating criminals as victims and toward a rehabilitative approach that has had a dismal record of success.

In his analysis of the effects of "scientific materialism" on US jurisprudence, West resembles Chicken Little. He concludes his trip down the slippery slope by stating:

> Scientific materialism, by contrast [with what West calls the traditional legal system], presumed that all behaviors could be reduced to material causes rather than the free choice of the individual; according to this view, it was unclear that anyone could ever be considered 'morally blameworthy' in the classical sense. The scientific view threatened to undo the Western conception of criminal justice. (p 72–3)

West suggests that to treat the psychologically or physiologically damaged criminal differently is to rob him or her of her humanity since it does not interpret his or her actions as those of a rational being. West makes no distinction between the moral culpability of the individuals in these cases and asserts that the success of these kinds of mental-illness defenses have detrimentally altered not just the decisions in these cases but also the ways in which the justice system deals with criminals after they are convicted.

And this is just the beginning, West assures us:

> But the dehumanizing effects of scientific materialism reach far beyond our criminal-justice system. Reductionist thinking has been applied to the fields of business, economics, and welfare — with equally grim results. In the next section, we will look at the pervasive impact of Darwinism [egad!] and scientific materialism on conflicts over wealth and poverty in America. (p 101)

Apparently West does not like the direction our criminal justice system has developed over the past 150 years, and Darwin is to blame.

On the other hand, West does like free markets and therefore he asserts, "Myths aside, Darwinism has offered little genuine support for *laissez faire* capitalism" (p 117). This is fascinating footwork, which exhibits a troubling inconsistency in the apportioning of influence. In the next chapter, "Breeding Our Way out of Poverty", the Darwinian specter returns to haunt West's analysis. While the idea of competition as positively applied in the context of business is attributed to Hobbes, Malthus, and Adam Smith, when West shifts gears to discuss eugenic approaches to welfare policy, Hobbes, Malthus, and Smith disappear, and his favorite bogeyman returns, especially among the elites that he particularly disdains.

West's analysis concludes with the claim that it was:

> [s]cience with a capital S [that] dictated the replacement of punishment with treatment in the criminal justice system, the enactment of forced sterilization in the welfare system, and the substitution of value-free information from sex researchers for traditional moral teachings about family life in public schools (p 361)

That's a pretty bad track record, and therefore, again according to West, we should reject the "growing chorus [that] urges public policy be dictated by the majority of scientific experts without input from anyone else (p 362).

This is a straw man. While there are indeed outspoken scientists who advocate for various policy positions and funding decisions, it is not the case that these individuals demand or could have unilateral decision-making power.

Despite a plethora of footnotes and multiple citations of the work of his colleagues at the Discovery Institute, West is clearly not dealing with reality. He simply ignores scholarship by anyone outside of a tight group of ideological fellow travelers. West's analysis of Social Darwinism rests largely on challenging Richard Hofstadter's 1955 thesis, which has been modified and updated by scores of historians since the mid-century. His chapters on eugenics cite Daniel Kevles's early work on the history of the eugenics movement but fail to engage the past 20 years of scholarship on this issue. The idea that somehow scientists in the US have been dictating social policy for the past century is on the face of it ludicrous. West's book is frustrating, and deeply depressing. Perhaps its only positive function is that it provides a very clear window into a very particular view of history that is shared by the members of the Discovery Institute and their sympathizers.

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Intelligent Design: Science or Religion? Critical Perspectives

edited by Robert M Baird and Stuart E Rosenbaum
Amherst NY: Prometheus Books, 2007. 338 pages

Reviewed by Taner Edis

Our public debates over "intelligent design" (ID) creationism tend to center on theological and political convictions, though ostensibly they are about natural science. After all, "intelligent design" is bad science, or "dead science" as Philip Kitcher puts it, so the scientific community treats it as a nuisance. A handful of scientists have

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exposed the weaknesses of ID in some technical detail, but everyone knows the real action takes place outside of science.

In this environment, *Intelligent Design*, a collection edited by Robert Baird and Stuart Rosenbaum, provides a very useful introduction to the most popular arguments made by public defenders of evolution. Some of the contributors address scientific questions, but they never get overly technical, and they always keep the public discussion in mind. And the bulk of the essays address questions about "intelligent design" and the science classroom, including the burning question for most Americans: whether evolution is compatible with religion. Since the evolution wars in the United States are really political contests between traditionalist and modernist forms of religion, *Intelligent Design* voices a liberal, modernist theological point of view, according to which science and religion, when understood correctly, occupy separate spheres and are therefore compatible. Also, importantly, the book focuses almost entirely on the question of ID in biology, including writers such as Owen Gingerich who otherwise defend a watered-down form of ID in the context of physical cosmology.

That much does not distinguish this book from others in the market. But as a compact, readable introduction to a liberal religious critique of ID in biology, it is well-worth reading and should be useful to teachers and members of the community who want to find out more from critics of ID. Reading through the essays they will find reflections on the trial at Dover, short op-ed style responses to ID, and even some short selections from Darwin and Paley that help put the debate in context. They will definitely find ammunition against the irritating charge that accepting biological evolution means abandoning religious allegiances. If more people read and agreed with books like this, the jobs of everyone who teaches science in the United States would be much easier.

I would love to give this book to a high school teacher. Still, having said that, I find myself asking: how would someone respond if they were already inclined to favor ID? How persuasive would it be for someone not convinced that we can split the difference, let science and religion occupy their separate spheres, and end up with everyone happy all at once?

One reason I am prompted to raise the question is that I find such compatibilism too cheap, too politically convenient. (As someone who teaches science, I certainly find it convenient. But then, the stereotype of a waffling liberal is supposed to be someone who cannot be zealous even about his own interests.) For example, *Intelligent Design* includes Stephen Jay Gould's classic "Nonoverlapping magisteria." Rereading it, I am still unconvinced. I am even less moved by the editors' and Alfred I Tauber's Kantian approach to separate spheres. It all comes across as a bit too faith-based for my taste.

But that does not detract from the value of the book. Any disagreements I can summon up here are largely academic, and politically irrelevant. They certainly would have no effect whatsoever on what happens in a science classroom. If I have a concern, it is that I worry that creationists and ID sympathizers that I know are not impressed by liberal compatibilism. And they are intelligent people with substantial questions about divine action and what they see as the basic religious requirement of a top-down, mind-first, supernaturally governed universe. ID resonates with their religious intuitions, and liberal theology invariably comes across as overly sophisticated backpedaling. Now, I cannot help them. But I am not sure that handing them a copy of Baird and Rosenbaum's book would do much to quiet their fears about evolution either.

I do not want my worries to distract from the virtues of what is quite a decent book. *Intelligent Design* represents a very mainstream position adopted by public defenders of evolution in the United States. But especially outside the technical scientific context, an important virtue of an accessible defense of evolution should be its persuasive quality. I am not very confident about this. I would love to say I have some better idea myself. But I confess I do not, and I worry about relying too much on what has become a well-stereotyped set of arguments in favor of excluding ID from education. It would be intriguing to see if we have any new and imaginative ideas about how to persuade the public that only evolution deserves a place in the biology classroom. I do not see such ideas in *Intelligent Design*, but if this is a failure, it is a failure of all of us active in defending the integrity of science education.

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The Devil in Dover: An Insider's Story of Dogma v Darwin in Small-Town America

by Lauri Lebo
New York: The New Press, 2008.
256 pages

Reviewed by Burt Humburg

The pages of *RNCSE* are replete with stories of municipalities flirting with anti-evolution policies. The stories that make their way into press or blogs are often limited to the essentials; detailed and researched accounts are rare. Even the court record from the recent *Kitzmiller v Dover Area School Board* trial provides only a limited version of what

Burt Humburg is a graduate of the University of Kansas School of Medicine, now starting a pulmonary and critical care fellowship at the University of Michigan. A former member of the board of Kansas Citizens for Science, he was a resident in internal medicine in Hershey, Pennsylvania — about forty miles from Dover — during the Kitzmiller trial.

the reader instinctively knows is a bigger story.

At the very least, Lauri Lebo provides the missing details in *The Devil in Dover.* But she provides so much more, plying her journalistic trade to pick up on emotional cues to investigate where others had not, uniquely enriching her narrative. History comes alive in her account — from Judge Jones's withering questioning of creationist defendant Alan Bonsell on the stand, to the inner uncertainty and eventual triumph of the individual plaintiffs and their attorneys, to the description of small-town life in Dover and how it was affected by the trial — written with a perspective only a native of the area could provide.

Lebo demonstrably takes her journalism seriously. When her editors pressured her to make her coverage of "intelligent design" more balanced, she refused to present it as stronger than it was or mindlessly to parrot its talking points suggesting that evolution is unreliable. Rather, she found balance by humanizing her subjects, including the defendants and their supporters. Here is creationist defendant Bonsell and the helplessness he felt when his wife was fighting breast cancer. Here is the joy that a creationist pastor had when working with his congregation. Moreover, she researched the journalistic authorities who came up with the idea of journalistic balance in the first place, demonstrated that the current practice represents a perversion of their original intent, and effectively rebutted her addled editors.

Lebo herself changes over the course of her narrative, amply evidenced by the endearing and poignant personal detail she included. As a beat reporter for a local paper who covered educational issues, she was initially intrigued about the creationist claims to demonstrate scientifically the existence of God, but her interest soured when the absurdities of the creationist case became plain. She writes of the ever more questions she asked of her scientist sources, and the reader sees her learning. The Linnaean genus/species names for organisms and the examples she finds of biological principles in action, far from being distractions, serve to evince her growing enthusiasm for science. She even becomes a kind of practitioner, at one point applying what she learned to the identification of a flaw in the talking points of creationist Jonathan Wells during a conversation with him, only later discussing the matter with scientists and finding out she reached the correct conclusion.

Alas, Lebo's father, whom she credited for inspiring her early childhood interest in science but who had later turned to fundamentalism in financial desperation, could not endorse the skeptical methods of science and its conclusion of evolution. The frustration Lebo felt in trying to reach him is beautifully transmitted: where she found joy in understanding, he found solace in the certainty of a simple faith. As the creationist case collapses, Lebo tries to find common ground with her father, but their values are too different and he retreats ever more into his faith, a creationist to the end. Another encounter with a committed and ailing creationist similarly reveals Lebo's compassion and honesty. Unable to find anything else to write in a get-well card for creationist defendant William Buckingham, Lebo writes that she would pray for him — and then follows through, praying, she says, for the first time in years.

Ultimately, Lebo's poignant and personal narrative mirrors the national struggle of science advocacy. The denial of reality in the service of faith by her father is all too common in our nation, playing out in politics and in other towns. The idea that journalistic balance should entail portraying two opposite perspectives as equals, even when only one is coherent, strong, and widely supported, is also all too common and plays out in newspapers and television stations across our nation. The portability provided by Lebo's examples and the parallels between her personal and our nationwide struggles are what makes her book such a unique contribution to the literature. Readers who take from her 224 well-written and quickly-read pages a better understanding of the struggle to find common ground with the faithful or are inspired to press for journalistic reform away from the abiding perversion of balance will not have missed the point.

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The Cell's Design: How Chemistry Reveals the Creator's Artistry

by Fazale Rana
Grand Rapids (MI): Baker Books, 2008. 332 pages

Reviewed by Frank Steiner

After reading Fazale Rana's *The Cell's Design*, the sequel to *Origins of Life* (Rana and Ross 2004; reviewed in *RNCSE* 2007 May–Aug; 27 [3–4]: 45–8), I was reminded of John Conlee's 1979 lyrics, "These rose colored glasses, that I'm looking through / Show only the beauty, 'cause they hide all the truth."This country music classic sums up Rana's book, which starts with the foregone conclusion that the cell is designed, by explaining the principles (with reference to Dembski and Behe) of "intelligent design" (in chapter 1). Thereafter, everything is presented through this lens. The material in chapter 1 attests to the fact that the lessons learned from the recent *Kitzmiller v Dover* case were completely (albeit conveniently) ignored by the author, just as they have been by the "intelligent design" community. One must read this book in a fog of scientific denial and delusion, and accept the fact that the author totally ignores and neglects to inform the reader of the most important and wonderful aspect of science, namely the process of scientific inquiry. Some of the assumptions about the universal acceptance of "intelligent design" are absolutely unfounded, to say the least!

Initially, I thought about recom-

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mending this book to my undergraduates as a nice review of general cellular and biochemical phenomena, but after getting through the first nine of the fourteen chapters, I realized (though painfully) that the author was just merely reinterpreting (and without sound scientific basis) commonly known biochemical aspects of the cell, and was not offering any new scientific information, data, or scientific insights. In fact, practically every topic is one that I cover in my advanced cell biology course. But there are startling omissions, such as the endosymbiotic origin of mitochondria and chloroplasts and the residual nucleomorphs found in several algal species, and the origin of human chromosome #2 in the telomeric fusion of two ancestral acrocentric chromosomes. The author essentially treats virtually every standard molecular/cell biology or biochemistry text as a mere arsenal of weaponry to "shock and awe" his readers (however, he particularly favored Lodish and others 2000 and Stryer 1988, which are cited 35 times in the endnotes).

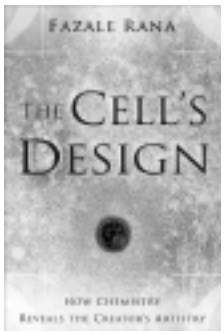
Prior to reading this book, I first perused the glossary and was frustrated by the circularity of many of the definitions that tended to use other glossary terms for their definition, and so on. As a microbiologist, I was particularly frustrated by Rana's inaccurate descriptions of various nutritional biochemical "trophisms", such as autotroph, chemotroph, and a missing term, lithotroph. My current microbiology students would have been confused by Rana's particular definitions of those terms. Although apparently meant to be somewhat of a cell biology primer for the general lay reader, the inaccuracies show that little attention was given to this part of the book, and that it was essentially an afterthought. Similar inaccuracies appear in the text as well; for example, the author refers to the viral capsid as a "capsule", which in bacteriology is something completely different.

Even a reviewer for the evangelical publication *Christianity Today*, Craig M Story of Gordon College, has already addressed what is basically wrong with Rana's interpretation of the biochemical workings of the cell (Story 2008), but I will try to be a bit more specific.

Having taught courses in biochemistry, cell and molecular biology, virology, immunology, and microbiology, the principal scientific problem that I have with Rana's approach is that each of his "design" examples — or what he produces as evidence for design — is presented in such general terms that he has glossed over the diversity represented in related systems or organisms, all of which can be accounted for by evolutionary mechanisms. For instance, Rana claims that all bacterial "chromosomes" are circular; but we now know that some bacterial genomes are combinations of linear and circular "chromosomes", while others contain mini-circular chromosomes, in addition to numerous plasmids. Equally problematic is the question of theodicy: if everything in and of cells were designed, would that not also apply to cancer cells? Perhaps the author should consider explaining the recruitment of cellular genes and cellular processes leading to cancer, assuming the irreducible complexity of cellular components. And what would that say about the Creator?

Upon finishing Rana's book, the phrase "all dressed up with no place to go" came immediately to mind. The subtitle, "How Chemistry Reveals the Creator's Artistry," is also somewhat misleading in that the book is really not about chemistry or chemical processes, but rather about molecules and biochemicals. Curiously, this book is all about the order of things that are designed, but there is not one mention of entropy until chapter 13 (p 246)! The author might have simply written a preamble to be taped onto the cover of every leading molecular/cell biology textbook stating, "The Creator's artistry is unquestionably evident in the subjects discussed throughout this entire book." This would have been much easier than selectively rehashing its contents, and saved the author, and the publisher, considerable time and effort.

I honestly cannot recommend this book to anyone, since it lacks a true scientific perspective as well as an objective scientific explanation of modern cell biology. Most of the "new" material in *The Cell's Design* is just a rehash of material presented in other "intelligent design" books, and does not represent, as the author states, "work of unprecedented magnitude never compiled before." Prior to reading this book, I finished Ken Miller's *Only a Theory* (2008), the sequel to his earlier book, *Finding Darwin's God* (1999). I would recommend these two excellent books instead of Rana's to anyone interested in the "intelligent design" controversy, as a true and objective scientific presentation is provided in both.



This book is a testament (no pun intended) to the failure of discrete politicized religious factions to accommodate their religious beliefs adequately within the scientific knowledge of today. One can certainly be a Christian or a person of faith and not have to impute design to every (or any) aspect of the cell (one might ask, isn't God great enough to let life evolve?). The process of scientific inquiry is allowing scientists to learn more about life at the cellular and molecular level, and while we do not yet have all of the answers as to why things occur as they do, nevertheless, the fact that we do not know entirely why things are organized the way are does not mean that they must be designed.

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